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PATHOLOGICAL ANATOMY
OF THE
FEMALE SEXUAL ORGANS.

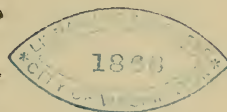
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VOL. I.—AFFECTIONS OF THE UTERUS.

PREFACE.

IN presenting to the medical profession a translation of Klob's eminent work, the translators trust that they need offer no apology for having increased the number of works on this subject already in existence. The Gynecologist, previous to this publication, was compelled to search for information regarding the pathological anatomy of this specialty among the general treatises on this subject, and the clinical works on the diseases of females, as well as articles published at various times in periodicals. The scientific work on the pathology of the diseases of the genital organs of women which is now presented to the reader, exhausts, as far as possible, the anatomical researches made up to the present time in this department of medicine. It embraces the latest views of the German school, together with many original ones of the author.

Only those who are acquainted with the original of this work, can appreciate the difficulties with which the translators have had to contend. The peculiarities of style of some German authors, the novelty of their views, and the number of new

technical terms for which equivalents must be found, rendering the task of translation an exceedingly arduous one. The translators have sought chiefly to give the exact meaning of the author, therefore scientific terms, perhaps not so familiar to the general reader, have been retained whenever intelligible.

Lastly, the translators are fully aware that the present volume cannot be classed with light literature, it being a work more for study than for casual reading.

NEW YORK, December, 1867.

INTRODUCTION.

THE actions of morbid, as well as healthy life, are manifested in three ways :

1. As plastic creative action—*Formation*.
2. As an action which ensures the normal maintenance of the parts—*Nutrition*.
3. As that action which must be supposed to exist, even in the minutest parts of tissues, and also in elementary organizations, and by means of which they are enabled to fulfil their physiological ends in the system, and are rendered serviceable—*Function*.

To pathological anatomy belongs the study of those material alterations which, differing from normal ones, occur in the tissues and their elementary component parts. That any alteration in the process of formation or nutrition, must necessarily produce alterations capable of being anatomically demonstrated, is self-evident. But, according to our present views, in regard to the functional actions of elementary organizations, normal functions are so dependent upon the integrity of the parts, that they can only be performed when the

elementary parts are normally formed and nourished. Any alteration in the function of the elementary component parts of a tissue, always presupposes some change in its nutrition or formation, and therefore we consider the alteration of a function in a manner which we term disease, as secondary; or, at least we presume, that where some exciting cause produces an apparently immediate alteration of function, this alteration cannot generally take place otherwise than by a simultaneous one in nutrition or formation, or both.

Pathological anatomy therefore investigates those apparent material changes which are produced by the formative and nutritive actions of morbid life, and we shall exclude from our task only those material alterations which consist rather of chemical metamorphoses and are not capable of anatomical demonstration; such belong to investigations of pathological chemistry. Functional alterations cannot be considered objects of investigation for pathological anatomy.

Consequently, pathological anatomy forms two great divisions, the one having for its object, in general and special, the investigation of the ANOMALIES OF FORMATION, the other the ANOMALIES OF NUTRITION.

The results of physiological formation are:

1. The normal foetal disposition of an organ and its development in normal form and position in proportion to the neighboring organs and the entire system. This also includes development in length, breadth and thickness, as well as the normal proportion of cavities.
2. The normal extra-uterine development of an organ and its tissues, and its growth, so far as this consists in the

development of new elements either in a gradual, progressive, or periodical manner, as peculiar to some tissues.

3. The restitution of elementary component parts, destroyed by the consumption of tissue, especially in the so-called transitory tissues with integral restitution, the group of which is being constantly enlarged.

4. Here we may include those normal formative actions which are observed in connection with the functions of certain organs, and the so-called physiological processes of involution may likewise be considered as the results of physiological formative action.

The result of physiological nutrition is the maintenance of the organs and tissues, especially in this sense, that the constituent parts of the ultimate active elements, after being metamorphosed in the course of the exchange of material, be returned to the tissues, by which they must be received in a normal manner and transformed into parts of, or assimilated with the same.

Pathological anatomy, as far as possible, distinguishes between the results of alterations of these actions, and treats of them separately as DERANGEMENTS OF FORMATION, and DERANGEMENTS OF NUTRITION.

The derangements of formation manifest themselves either in *quantity* or *quality*. Formation altered in *quantity* may be either an excess or deficiency of development. The anomalies of this class are partly congenital and partly acquired. Under influences mostly unknown foetal development may become excessive or deficient, or the very germ of an organ or tissue may be wanting. In the same manner,

derangements of formative irritation or irritability, occurring in extra-uterine life, may similarly result in excessive or deficient development.

Any alteration in the *quality* of formation affects both the external and internal conditions of organs and tissues. Among external conditions we include the form or shape and position of an organ, and in hollow organs the alterations in their cavities, especially as productive of changes in form. These anomalies, like those of quantity, are either congenital or acquired.

As regards the internal or textural conditions of the organs, a change in the quality of the formative action, transforms the normal tissue into one favorable for the development of the various so-called adventitious growths or neoplasms, which change generally coincides with a quantitative alteration in formation.

The result of such alterations in the quality of formation, is a proliferation of elements which frequently, in some way or other, resemble the tissues from which they arise. The more these new formations resemble in their development the parts from which they spring, so much the less has formative action been altered in quality. But the more their development differs from that of the parent tissue, so much the more different, various, and extraordinary has been the course of formative action. It then exceeds in quantity and quality, as in the development of bone, teeth, and cerebral substance in the ovaries.

Derangements of nutrition may be divided in the same manner into those of quantity and quality. But, by nutrition

we must not simply understand the ultimate process in the elements themselves, namely, the reception of material into the tissue, and its consumption and transformation, for these are the privileges of all organized bodies, but we must also consider the adduction of nutrient material, and the effects or consequences of increased or diminished introduction of material so far as manifested by local phenomena; and this we can do without hesitation, for, as Virchow says, life does not merely exist in the blood or nerves, but in all the elementary parts.

HYPERTROPHY of tissue is considered the result of increased nutrition: ATROPHY as a consequence of diminished nutrition. The menstrual changes in the uterus, for instance, represent a genuine although physiological hypertrophy. With the study of hypertrophy and atrophy, hyperæmia, anæmia, and the anatomical phenomena of inflammation are closely connected. Inflammation is universally considered as a derangement of nutrition, and we do not hesitate to treat it as such, although we cannot deny the influence of inflammatory stimulus upon formative action, and consequently its characteristic effects upon formation and nutrition. In inflammation consumption and proliferation, destruction and creation, are so closely united, that they cannot be separated without destroying the meaning of this term which is so difficult to define. In fact there is no formation without nutrition, and probably no nutrition without formation, although the latter condition depends chiefly on the peculiarity of the tissue. This we can positively assert of all the tissues subject to integral restitution, and

here the question arises, whether or not in all tissues, does the exchange of material consist more or less of integral renovation; which assumption is not wholly imaginary. For why should the blood corpuscle or epithelial cell be so inferior to the parenchymatous cell, that the latter should maintain its integrity by a supply of materia, and the former be condemned to an ephemeral existence? and in what respect is the hepatic cell superior to the epithelial cell in its organization, that we should be authorized to make such an assertion? In the liver, for instance, it is true we cannot directly demonstrate the elements of new-formation which are so easily found in the rete Malpighi. But where are we not at a loss for direct proofs? When have we demonstrated the brood-cell of the cylindrical epithelium of the intestines with a structure so complicated that lately it has been doubted whether it belonged to the simple cell-formation? Yet, no one doubts of its integral restitution. And although our means of investigation are not sufficient to allow us to speak of the different organization of cells and to dissect them, nevertheless, researches latterly made, have evidently rendered doubtful the theory that the cell is the ultimate element of organization; and from the moment we drop it, the distinction between tissues with and without integral restitution, is at once set aside.

We cannot here continue the discussion of these highly important questions, although they are of the utmost importance for the formation of a new classification in physiology as well as in pathology.

It will probably depend upon the quality of nutrition itself

whether its chemical process leads to normal results. When it is altered in quality, dependent either on changes in the nutritive material or on the abnormal energy of the nutritive irritability of the elementary parts, the result will be different, inasmuch as certain products of metamorphosis or altered action become visible in the elements of tissue. These processes are known as *degenerative atrophy*, (Virchow), and *retrograde metamorphoses* (amyloid and cheesy degeneration, etc.)

The classification to which I have adhered would now seem to be sufficiently well established. A further discussion of the matter would be out of place, and I must refer to the works on this subject written by Virchow and others, which have long since been laid before the medical profession.



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E R R A T A .

- Page 5, second paragraph, read; "By the end of the," instead of
 "During the eighth and."
- " 10, line 7, omit "that" after "happens."
- " 35, 5th line from bottom, read, "Quality," instead of "Quantity."
- " 36, 2nd " " omit "that" before "a uterus."
- " 40, II. instead of III. before "ANOMALIES OF" etc.
- " 44, III. instead of IV. " " " "
- " 108, 6th line from bottom, read, "non-gravid," instead of "gravid."
- " 112, second paragraph, 4th line, read, "obstruction," instead of "oc-
 clusion."
- " " second paragraph, 10th line, read, "obstructions," instead of "oc-
 clusions."
- " 121, New heading, read, "TYMPANITES," instead of "TYMPANITIS,"
- " 125, third paragraph, read, "Krimer," instead of "Krüner."
- " 161, 3d line from bottom, read, "lamina," instead of "laminae."
- " 185, second paragraph, 5th line, read, "*ectasia*," instead of "*ectasiæ*."
- " 217, 15th line from top, read, "on the venous," instead of "in the
 venous."
- " 230, first paragraph, insert *we*, after "that."

ANOMALIES OF THE UTERUS.

AS HAS already been stated in the introduction, those anomalies of the uterus which are subjects of pathological investigation are divided into anomalies of formation and anomalies of nutrition.

ANOMALIES OF FORMATION.

FORMATIVE action in the generative apparatus may be considered under three periodic divisions. The first result of this action is the primary development or disposition of the genital organs; it may, therefore, be termed intra-uterine or foetal formation or development. In extra-uterine life, formative action causes the further development of these organs in conformity with the whole organism. It has long since been proved that only few and inconsiderable changes occur in the genital apparatus from the time of birth until puberty, and that the results of the second period of development are of much the lesser importance, whilst, at the time of maturity, a powerful energy of the formative action is again manifested. We, therefore, denominate the effects of this second formative action as the process of the development of puberty.

When the period of puberty has been reached, this action, with the exception of continued ovulation and the changes ac-

companying pregnancy, is merely destined to replace the waste of organic material, and thus to normally maintain the existence of the generative organs. After the climacteric period, however, the physiological involution of these parts commences in a regular manner.

I. ANOMALIES OF FŒTAL DISPOSITION AND DEVELOPMENT.

HISTOLOGICAL PRELIMINARIES.

Literature on embryology of the genitals: C. F. Wolff, *De formatione intestinorum*. *Novi Comment. Acad. Scient. J. Petrop.* XII. 1768 and XIII. 1769.—J. F. Meckel, *Beiträge zur vergleichenden Anatomie* 1808. Bd. I. Hft. 1. By the same author, *Handb. der menschl. Anat.* Halle und Berlin 1815—1820. IV. Bd. — Senn, *Mém. sur l'état des org. génitaux de la femme avant la puberté etc.* *Journ. univ. des scienc. méd.* Tom. 37. 1825. — Joh. Müller, *Bildungsgeschichte der Genitalien*. Düsseldorf, 1830. — Rathke, *Abhandl. zur Bildungs. und Entwicklungsgesch. des Menschen und der Thiere*. Leipzig 1832. Bd. I. — Krause, *Handb. der menschl. Anatomie*. Hannover 1841—1843. — Bischoff, *Entwicklungsgeschichte der Säugeth. und des Menschen*. Leipz. 1842. Arnold, *Handb. der Anatomie des Menschen* II. Abth. 1. 1847. — Thiersch, *Bildungsfehler der Hern und Geschlechtswerkzeuge eines Mannes*. *Münchner ill. med. Zeitung* 1852. Bd. I Heft 1. — Leuckart, *das Weber'sche Organ und seine Metamorphosen*. *Münchner ill. med. Zeitung*, 1852. I. 2. — Kussmaul, *Von dem Mangel, der Verkümmerung und Verdopplung der Gebärmutter etc.* Würzburg 1859. — Albers, *die weibliche Cloakbildung*. *Monatschrift f. Geburtsk. und Frauenkrankh.* Berlin 1860. Bd. XVI. Heft 4. — Kölliker, *Entwicklungsgeschichte des Menschen und der höheren Thiere*. Leipzig 1861. Besides these, the works on embryology and the special chapters on the same, in the hand books on anatomy and physiology.

THE primary elements of the uterus consist of a pair of filamentous organs situated on either side of the inferior portion of the vertebral column, and inwardly and anteriorly to the Wolffian ducts, with which they first descend, and passing

behind which, at a later period, descend with them into the *sinus urogenitalis*. Each of these primordial elements, known as Müller's filaments, therefore, makes half a spiral turn around their corresponding Wolffian ducts.

Müller's filaments, in their rudimentary form, are recognizable as solid cords, which, at a later period, become perforated (Rathke confirmed by Bischoff, Thiersch and Kölliker). Rathke considered them as primary elements of the uterus and Fallopian tubes, and supposed the vagina to be developed independently of them from an inversion of the *canalis urogenitalis*, which opinion has lately been again advanced by Albers. Since the investigations of Bischoff and Leuckart, however, most authors assume that not only the oviducts and uterus but also the vagina are developed from Müller's filaments, and, therefore, basing my views on pathological data, I do not hesitate to share in this opinion.

The superior extremities of Müller's filaments are slightly enlarged and club-shaped. After a time the inferior ends begin to approximate and coalesce at that point where Hunter's ligament, or later, where the round ligaments come off, and from these united parts the uterus is developed, while the ununited extremities shape themselves into the Fallopian tubes. The point, therefore, at which coalescence occurs, and where the round ligaments originate, affords a sure point of demarcation between the uterus and Fallopian tubes, which, in certain cases, is of great importance.

As to the period at which these different stages of development occur, it must be mentioned that up to the sixth week of foetal life, no trace of the generative apparatus can be found (Meckel), and that there is absolutely no difference in the early development of Müller's filaments, in either male or female.

If Müller's filaments are to be developed into female organs of generation, they undergo further changes. Cavities are formed in them, and they become little canals, while on the other hand the Wolffian ducts become shrivelled, and are

transformed into the so called female epididymites or Rosenmüller's organs. In the development of male organs almost the opposite changes take place.

In the female foetus at about the eighth week the inferior extremities of Müller's filaments have coalesced, and at the same time the ovaries as well as the oviducts (the superior ends of Müller's filaments) come lower down. About this period the coalescent portions of Müller's ducts exhibit a right and left cavity separated by a septum; this septum, however, soon begins to disappear throughout the whole line of their union, commencing from below upwards, so that finally the cavities of the uterus and vagina become one.

At the fifth month the uterus and vagina are distinctly separate; the superior extremities of Müller's ducts, which are transformed into the extremities of the Fallopian tubes, expand and become slightly fimbriated, and the upper portion of the uterus diverges into two horns or processes. That portion which is to form the fundus, and unite these horns, not being yet developed, the union of the horns is only accomplished at the beginning of the sixth month, after which time a fundus uteri, somewhat arch-shaped, rises above the level of the orifices of the oviducts. The abdominal openings of the oviducts now become funnel-shaped and the fimbriæ of the superior extremities become more numerous, longer and broader, and also more distinct from the ovaries.

During the sixth and seventh months the uterus becomes more cylindriciform and of greater bulk, its horns diverge at an incomplete rectangle, and from being drawn into its substance they seem to be disappearing. This increased bulk is most marked in the cervix however, its walls at this time greatly exceeding those of the body of the uterus. On the interior surface of the uterus the *palma plicata* extends almost to the fundus, and from it folds extend laterally to the orifices of the oviducts. The mucous membrane also of the vagina becomes covered with excrescences, extending in

rows, from which at a later period transverse folds are developed.

During the eighth and ninth months of fœtal life the fundus uteri becomes more rounded, and the disproportion in the thickness of the walls of the body and neck of the uterus is more equalized, although at the time of birth, and even after, the substance of the cervix considerably exceeds that of the body of the uterus. The oviducts at this time are very tortuous.

During the eighth and ninth months, and at the time of birth, the uterus has undergone its primary development, and its further growth ceases whilst other changes in the system occur. It is only at the beginning of puberty, when the organ is to perform its actual function, that it undergoes a second stage of development, whilst from birth until the fourteenth year but slight changes are noticeable. At the time of second dentition the *palma plicata* of the body of the uterus disappears, with the exception of a longitudinal fold, and the bulk of body and cervix becomes more equal, the organ then gradually descends into the pelvic cavity, and the vaginal segment becomes more distinctly formed.

During the development of puberty, the uterus increases considerably in size. Arnold has shown that this increase continues even beyond the twentieth year, and of such importance is this circumstance, that it should be taken into consideration by those about to marry, more than it usually is.

The body of the uterus during puberty gradually becomes longer, and its walls increase in thickness, especially in comparison with those of the cervix; the last trace of the *palma plicata* in the mucous membrane of the body now vanishes, and the mucous membrane becomes thicker by the formation of glandular tissue. The walls of the cervix also thicken, its deep furrows and insections disappear, and it becomes smooth and firm, and thus the virgin uterus becomes two or three inches long, its thinnest portion being that around the internal orifice;

the walls of the body, in the middle, are four to six lines in thickness.

The anatomical changes which take place in the uterus during menstruation are well known. During the hyperæmia in the genital organs, which occurs at the time of menstruation, the uterus enlarges considerably, its muscular substance becomes more succulent and softer, its mucous membrane thicker, of a dark red color, exudes blood, and, owing to extravasations within its tissue, is covered with dark spots; the utricular glands in the body and fundus elongate in proportion as the mucous membrane thickens, and a section of the latter presents a fibrous appearance. Immediately at the commencement of menstruation, the ciliated epithelium of the mucous membrane is cast off, and a luxuriant production of epithelial cells commences, resembling the *rete Malpighi*, and which undergoes desquamation untill the termination of menstruation, when they again become ciliated epithelium; the menstrual congestion of the uterus then also suddenly diminishes. The mucous membrane of the cervix undergoes few or very slight changes, and both lips of the vaginal segment become equal in length. We will treat of the development of the uterus during pregnancy and its subsequent involution, under the subject of PUERPERAL AFFECTIONS, and the changes to which it is subject in the climacteric years, under the head of SENILE CHANGES OF THE UTERUS.

From what we have stated, it follows that the uterus has strictly only two stages of development; the former of which may be termed the *intra-uterine* or *fœtal*, the latter that of *puberty*. Uterine development results in the formation of a comparatively complete sexual apparatus, which retains a fœtal character until puberty, when, as compared with the extra-uterine development of other organs, it is more fully developed in correspondence with the importance which the female sexual organs then assume. The uterus of a girl who has not yet menstruated, differs but slightly from that of

a newly born infant. With the maturing of the first ovum and the commencement of those periodic phenomena which from this time denote the capability of the female to fulfil her destiny, a powerful energy of the formative action, equal in importance to that of intra-uterine life, is aroused in the generative apparatus.

These various physiological stages of development are sometimes deranged, and they may be arrested or hindered in some way by various circumstances, or may even exceed the normal measure. Their physiological variety is equalled by the pathological changes which accompany each of these periods of development, and in general it may be said that anomalies arising from arrest in development are by far the most frequent and important.

A. ANOMALIES OF PRIMARY DEVELOPMENT BY FORMATION ALTERED IN QUANTITY.

ANOMALIES due to derangement in development, consist either in a transgression of the physiological limits of development, or an arrest of growth within those limits. In the uterus anomalies of the former kind are rare, whilst those due to arrest of development are frequently met with.

1. EXCESS OF DEVELOPMENT.

Literature: Meckel, *Handb. der Path. Anat.* Leipzig 1812. Bd.

II. Abth. I. pag. 4.—Kussmaul in the work mentioned in the literature of previous chapter, pag. 42.—Förster, *die Missbildungen des Menschen*. Jena 1861, pag. 166.

WE may consider those cases, in which the uterus of the newborn infant is equal in size to that of the female approaching puberty, as transgressions of the usual intra-uterine development, and consequently, also those cases in which the body and fundus of the uterus are of excessive size and the disproportion between them and the cervix has ceased to exist. Meckel quotes the case observed by Kerkring (*Observ. Anatom.* 87. p. 169) in which menstruation made its appearance regularly

from the day of birth; also that of Langlade (*Mem. de Paris*, 1708. hist.) and that of Cunnen (*Eph. n. c. dec. 1. a. III. o. CXIV.*) in which it commenced between the eighth and twentieth day of life. Cooke (*Med. Chirur. Trans. vol. II. 1817*) relates a case in which the external genitals exhibited premature development. Kussmaul mentions one in which menstruation made its appearance in a girl two years old, and conception taking place in the eighth year, was followed by the normal birth of a completely developed foetus. It is impossible to say more on such cases, and therefore I restrict myself to these few remarks.

II. ARRESTS OF DEVELOPMENT.

1. ABSENCE OR DEFECT OF THE UTERUS.

Literature: Realdus Columbus, *De re anatomica* Lib. XV. pag. 495. Paris 1572 (described as *Vulva rara*)—Morgagni, *De sedibus et causis morborum. Venetiis. 1761. Lib. III. Ep. 46. art. 11—13.* (only cases of living individuals, therefore doubtful.)—G. Hill, *Diss. de utero deficiente* Prag 1777.—Engel, *Diss. de utero deficiente, Regiomonti* 1781. (both doubtful cases.)—Voigtel, *path. Anatomie* Bd. III. pag. 452. Halle 1805.—J. F. Meckel *Handb. d. path. Anatomie* Leipzig 1812. Bd. I. pag. 658.—Baudelocque, *L'art des accouchem.* 3m. édition. Tom. I. pag. 168. (only in living individuals.)—Dupuytren, *Rev. méd. franc. etc. Bd. XII.*—Langenbeck, *Neue Bibliothek für Chirurgie. Bd. IV. 3.*—Stein in *Bonn. Aufeland's Journ. f. pract. Heikunde etc. XLVIII. Bd. Mai* 1819.—Burggræve, *Annal. d'oculist. et de gynécologie* Vol. I. Liv. 12. (description of two cases universally quoted, but which do not prove absence of the uterus.)—Grunder, *Virgo sine utero; Preuss. Vereins-Zeitung. 1848. II. 6.*—Ziehl, *Med. Corr. Bl. bayr. Aerzte. 1849. II. pag. 780.*—Kiwisch *klin. Vorträge etc. 2 Aufl. 1849. II. pag. 357.*—Kussmaul, as previously quoted, pag. 44.—Förster, *Die Missbildungen des Menschen, Jena* 1861. pag. 160.—Gintrac, *Journ. de Bordeaux. Janv. 1861.*

COMPLETE absence of the uterus has been doubted by many, partly because a more careful study of cases recorded as authentic rendered the presence of rudiments of a uterus presumable or evident, and partly because cases of absence of the uterus, which are founded simply on examination of living

women, do not seem sufficiently conclusive. To the latter class by far the greatest number of recorded cases, belong.

Notwithstanding this it has been proved that the uterus may be entirely absent, and in such cases both the oviducts and ovaries, especially the former, may exist either in a rudimentary condition, or may also be wanting. In the latter case it is exceedingly difficult to divine the sex of new-born children, the rudimentary development of the external genitals affording no means of deciding. The internal appearance of the pelvic cavity in such cases, is exactly similar to that of the male. The peritoneum descends backwards from the neck of the bladder in an ample curve enclosing the rectum in the usual manner, towards the posterior walls of the pelvic cavity (Quain). There is consequently a deficiency of that transverse fold which covers the uterus. When the Fallopian tubes and ovaries exist, they are situated in the superior margin of a deep-seated broad ligament, which extending from both lateral parietes of the pelvis, inwards and backwards, reaches the lowest position in that region which ought to contain the peritoneum-covered portion of the uterus. In other cases, the peritoneum representing the broad ligaments, is found in the form of two half-moon shaped folds, on both sides of the bladder, in which folds the upper and outer portions of the Fallopian tubes and ovaries lie obliquely imbedded.

The round ligaments in such cases are never wanting, but branch off near the inner extremities of the ovaries, the Fallopian tubes being also shortened.

In regard to the condition of the other organs of the generative apparatus the following may be said. Where the uterus is absent the ovaries may be normally developed, and there are cases recorded in which Graafian follicles were found in them (Burggraave), but according to this authority the menstrual flow and sickness are said to be absent in such cases, whilst Scanzoni speaks of extravasation of blood and formation of cysts, which certainly cannot be imagined to take place with-

out ovulation. Although it is not probable that the ova in such cases are fully matured, still it is not easy to understand, why with a normal formation of the ovaries an imperfect ovulation should not possibly occur. Either of these hypotheses, however, should be considered of about equal value until the presence of mature ova is demonstrated.

It frequently happens that when the uterus is absent and the ovaries are present, that the latter are small and contain no traces of Graafian follicles or vesicles. Frequently also, as above mentioned, the ovaries are entirely absent.

The Fallopian tubes are generally shorter, their inner extremities being about two, or two and a half inches apart; they are either perfectly solid or partly hollow cords, the latter being especially the case in their exterior extremities; the abdominal orifices of these tubes are distinctly fimbriated. In all cases of complete absence of the uterus, the inner extremities of the Fallopian tubes seem to be perfectly solid for a certain distance. The case of Klinkosch, in which the perfectly permeable Fallopian tubes terminated in a small vesicle situated in the median line and closed in its lower portion, cannot be considered as belonging to this class of anomalies, this vesicle representing a rudimentary uterus. In many cases of absence of the uterus the Fallopian tubes are also wanting. The vagina is likewise often absent, or we find only its lower half, like a narrow cone-shaped passage.

Although the uterus, ovaries and tubes may be absent, yet the external genitals may be either perfect or defective. The nymphæ may be absent, the clitoris very small, and the external pudenda but slightly or not at all covered with hair, yet in absence of the uterus, ovaries and tubes, the contrary has been observed, (Burggraave). Whenever the external genitals are perfectly developed, rudiments of a vagina also exist. In adults of this kind the urethra is often found very much dilated from its having served as a vagina;

The breasts are frequently well developed (Morgagni and

others) and the pelvis may be of the usual female dimensions. The general characteristics of such individuals are decidedly feminine ; and in all it has been observed that sexual desire was not absent.

Complete absence of the uterus, especially when accompanied with defective Fallopian tubes and ovaries, is rarely found except in infants with an undeveloped condition of the lower half of the body and incapable of existence ; cases of absence of the uterus with complete development of the rest of the body have been but rarely met with.

In investigating the anatomical character of such cases, two circumstances must be particularly considered. First we must be convinced that no rudiments of the uterus exist, which may be almost inappreciable and are often found attached to the posterior walls of the bladder. Thus it is necessary for a perfect appreciation of these cases, to consider a thick layer of cellular tissue and muscular fibres in the place where the uterus should be, as a rudiment of the uterus, and to distinguish such cases from those of total absence. Secondly, it will be necessary to examine whether the case is not one of pseudo-hermaphroditism, which error would most likely occur where the testicles have not descended from the abdominal cavity.

It has also frequently happened that rudiments of uterine horns were mistaken for portions of oviducts or ovaries, and therefore leading to the supposition that the uterus was entirely absent. The point of insertion of the round ligaments will always explain the case, and muscular bodies, whether hollow or not, when situated interiorly to those ligaments must be considered as belonging to the uterus, and a proper attention to this fact will always preserve us from error.

2. RUDIMENTARY UTERUS (KUSSMAUL).

Literature: Mayer, Ueber Verdopplungen des Uterus u. s. w. Journal v. Graefe und Walther Bd. XIII. Hft. 4. 1829.—Dupuytren, Répét. d'anatomie patholog. Tom V. pag. 99. und Archives gén. de méd. 1829. pag. 548.—Macfarlane, Lancet, Aug. 18 1832.—Albers, Rust's Magaz. Bd. XLI. H. 1. pag. 27. 1833. (exquisite case of uterus bipartitus).—Lucas, Lancet, January 21. No. 699. 1837.—Rokitansky, Ueber die sogenannten Verdopplungen des Uterus. Oesterr. med. Jahrbücher Bd. XXVI. St. 1. 1838.—Mondini, Uteri humani bicorn. anatom. descriptio. cui animadv. nonnull. adjectae sunt, quae in univers. ad uteri evolut. spectant. Nov. commentar. acad. scient. instituti Bononiens. Tom II. 1833.—Nega, De congenit. genitalium foemineorum deformitatibus, Dissert. Vratislaviae. 1838.—Rocker, Berliner med. Centralzeitung, 3. Juli 1840. 27 St.—Mondini, Neue Zeitschr. f. Geburtskunde und Frauenkrankheiten. Berlin. 1846. Bd. XX.—Kussmaul, in the work previously mentioned, pag. 62 and in the following pages.

FROM the description of cases of absence of the uterus we next come to the description of those in which the uterus is indicated by the presence of muscular or fibrous structure. Such I will term cases of *rudimentary uterus*.

Most of the imperfect observations and reports of absence of the uterus undoubtedly belong to this class. At the point of junction between the round ligaments and the inner extremities of the Fallopian tubes, a thin membranous or fibrous septum is seen descending, and either merging into the posterior walls of the rectum, or tapering up from a cloaca or sinus urogenitalis in the direction of a rudimentary vagina, and ending in a blind sac. This form I would term *membranous uterine rudiment*, and classify with it the case of Lucas in which the vagina ended in a blind sac two and half inches from its orifice, and in place of the uterus, a membranous tissue, one inch in width, extended from the blind sac of the vagina to the position the uterus should have occupied; the round ligaments occupied the usual position, and were at the exterior limits of this membranous mass, with the inner extremities of the Fallopian tubes.

As a second form of rudimentary uterus, I consider the *bulky, densely fibrous* and *imperforate rudiment* of Kussmaul. The uterus in this form is represented by a round, fibrous, solid body, both sides of which elongate into two cord-like horns. The case of Klinkosch (Hill) in which a fixed cylindrical body three inches long was found in place of a uterus, Fallopian tubes and ovaries, belongs to this class. Kussmaul further mentions the cases of Dupuytren and Macfarlane as likewise belonging to the above.

As a third form of rudimentary uterus we describe the *bow-shaped* rudiment of Kussmaul. The uterus is represented by a flattened, solid, muscular ligament, extending across the pelvic cavity like a bow arched upwards, and merging on both sides into the round ligaments. The neck of the uterus is entirely absent, the horns and fundus being only outlined, and not forming a uterine cavity. Kussmaul mentions the cases of Nega and Krockner as illustrating this form.

The form next to be considered is that of an *imperforate body with round stalk-shaped horns* resembling a continuation of the round ligaments. Förster at the request of Kussmaul gave a description of the specimen in the Göttingen Museum, formerly described by Langenbeck as one of absence of the uterus, and he considers it as belonging to the form just mentioned.

The condition of the other organs of the generative apparatus and the body in general, in cases of rudimentary uterus, is similar to those in which the organ is completely absent.

The last mentioned form of rudimentary uterus is closely allied to that arrest of development which Mayer (of Bonn) calls *uterus bipartitus*, and others *uterus bifidus*.

In this form neither the body or cervix have been fully developed, the horns only being formed as round bodies either hollow throughout, or having a small cavity in them, which bodies cannot be easily confounded with other parts. They consist chiefly of flattened muscular fibres similar to the tissue of the uterus, and are found interior to the point where the round ligaments join

the Fallopian tubes. These rudimentary uterine horns are but slightly connected with each other, or they are united by means of a flat muscular or fibrous cord, representing the fundus uteri, and from which rudiments of the body and cervix branch off downwards.

The Fallopian tubes are rarely entirely absent in such cases, but are most generally normally formed, though sometimes they are only rudimentary. In the latter case they exist as either simple slender fibrous threads or as solid cords which end externally in an oblong cyst, (Mondini); or they are tubes distinctly fimbriated at their outer, and closed at their uterine extremities; sometimes also communicating with the cavity of the rudimentary uterine horns.

In uterus bipartitus the ovaries are also frequently rudimentary but rarely absent. The external genitals in many but not all cases are poorly developed and the pudendum sometimes exhibits but little or no growth of hair. The general character of such individuals is decidedly feminine and never reminds us of *viragos*.

It is hardly necessary to state that in such, conception can never take place. Considering, however, that the ovaries are frequently normally developed, it is not astonishing that ovulation and accompanying menstrual sickness should occur, which may in cases where the tubes communicating with the rudimentary uterine horns are perforated, give rise to hæmatometra (Förster).

In young individuals of this kind the vagina is generally rudimentary, still it is often considerably dilated by mechanical influences. Frequently, from the same cause, a rudimentary vagina is combined with a spacious urethra.

The pelvis is usually well formed, its outlet sometimes resembling that of the male (Rokitansky).

3. ONE-HORNED OR UNICORNUTED UTERUS.

Literature: Pole, Mem. of the Lond. med. soc. Vol. 2 pag. 507. 1794.—Meckel, Handb. d. patholog. Anat. Leipzig 1812. I. pag. 674. (considers the uterus unicornis at the highest degree of abnormal formation of the uterus, and in which the oviducts are not distinguishable from the horns of the uterus, and refers to Pole's case.)—Chaussier, Bullet. de la faculté de méd. a Paris. 1817. pag. 437.—Czihak, Dissert. de gravidit. extraut. accedit descriptio memorandae cujusdam graviditatis tubae. Heidelberg 1824.—Rokitansky (in the work quoted).—Vrolik, Tabulae ad illustrandam embryogenesim hominum et mammal. 1849. Tab. 89. Fig. 8.—Chari, Prager Vierteljahrsschrift 1854. II. pag. 98.—Puech, Compt. rend. hebdomad. d. Séanc. de l'Acad. de Science. Paris. 1855. p. 643. (especially as regards the formation of blood-vessels.)—Soltz, Gaz. médic. 1856. Oct. Nr. 40 und: Note sur le développement incomplét d'une des moitiés de l'uterus et sur la dependance du developpement de la matrice et de l'appareil urinaire. Strasbourg 1860.—Kussmaul and Förster in the works quoted.

THE one-horned uterus, properly speaking, represents only half a uterus, the normal organ being developed from only a single germ. The development of but one of Müller's ducts, either the right or left, will result in the above anomaly, which is the development of the right or left half of the uterus, and consequently an incomplete one with but one horn. The foetal outline of the other side is either undeveloped, deficient or rudimentary, exhibiting one of those forms described in the preceding chapter, as the rudimentary uterus, affecting both sides alike. In the one case where one side of the uterus shows no trace of development, the corresponding tubes and ovaries are also absent, in the other case the defective side has both tube and ovary. It is therefore proper to make a distinction between a uterus unicornis without, and one with an accompanying second rudimentary horn.

The appearance of the one-horned uterus is that of a long cylindrical or fusiform slender body, curved towards the side on which the horn is situated, and its superior conical end merging into an oviduct corresponding to the side to which a normal ovary is attached in the usual manner. Such a uterus completely

developed from one of Müller's ducts, is somewhat narrower than a normal one, and its section is tolerably round with a central cavity. As regards the sides of such a uterus, the developed or exterior one is concave, the undeveloped or interior one convex. The broad ligament of the normal side is considerably shorter than that of the opposite, the ligament of which is situated lower down in the pelvis.

The vaginal portion of the one-horned uterus is smaller, proportionately to the narrowness and diminished size of the organ. In the cervix the *palmæ plicatæ* approach much nearer to the margin (Rokitansky). The longitudinal axis of the uterus is not in the median line of the pelvic cavity, but deviates to the developed side, and is more curved in this direction than that of a normal one.

It must be remarked that in cases of apparently complete absence of the other horn, a rudimentary outline of it on the concave side of the uterus when the curve of the developed horn is most marked, is frequently overlooked. But when the second horn and its corresponding appendages are entirely absent, the broad ligament of this side extends from the lowest portion of the uterus to the lateral walls of the pelvis (Chiari). In many cases, however, especially in those where slight indications exist of the apparently deficient horn, there is found in the superior margin of the broad ligament of the rudimentary side, which is attached to the uterus somewhat higher than in those cases which Chiari mentions of complete absence of one-half of the generative apparatus, a thin solid cord or almost imperceptible line of fibres, terminating in a distinct rudimentary Fallopian tube, and either disappearing in the substance of the ligament or terminating externally in an imperfect but unmistakably fimbriated extremity, hollow to a certain distance, but always closed interiorly. The inner extremity of such a rudiment of an oviduct, is easily recognized in those cases in which a rudimentary round ligament branches off from the broad ligament towards the inner inguinal ring.

We have thus far treated of the entire absence of the second horn of the uterus, the various forms which it assumes in a rudimentary condition may, according to Kussmaul, be grouped as follows :

1. The second horn is only developed in outline, in the form of a thin muscular or fibrous filament, or

2. It appears as a flattened or round muscular imperforate cord, varying in length, and egg-shaped just before its point of junction with the round ligament.

3. The rudimentary half is hollow in the above-mentioned egg-shaped part, and this cavity communicates externally with the canal of the corresponding oviduct, which latter is either completely or nearly developed.

Rokitansky states that the body of the one-horned uterus contains less substance than the normal organ, and that its cervix always exceeds the body in length and thickness. But we must add that the cervix of a virgin uterus always exceeds the body in bulk, and just as it happens in the normal uterus, so in the one-horned, pregnancy sometimes permanently removes this disproportion. In those cases, however, of one-horned uterus, in which this normal virginal condition is more marked than usual, it might be presumed that the inferior portion of Müller's ducts from which the cervix uteri is formed, has perhaps, been normally developed on the side on which the rudimentary horn is situated, and been united in a normal manner to the other side, whilst that portion of the ducts from which the body and horns should have been formed, was entirely or partially undeveloped on that side. Such a uterus might be said to be developed in its three-fourths, and the absence of the last fourth would render it a one-horned uterus. This assumption is justified by observations of cases in which the upper half of a uterus was found fully developed with accompanying occlusion of the vagina, and others in which the upper half consisted of nothing but a hollow vesicular rudiment, whilst the cervix was of normal formation.

Ehrman (*Descript. de deux foetus monstres*, Strasburg, 1852,) saw a double-horned uterus, with incomplete division of the cavity by a septum, considerable folding of the mucous membrane and absence of the cervix in a siren-like monster. The uterus communicated by a small opening with the rectum (which was imperforate at its lower end). The external pudendum, vagina and bladder were wanting (Kussmaul).

The so-called fundus uteri being, strictly speaking, only formed by the middle portion uniting the diverging horns, it is therefore evident that the uterus unicornis has no fundus, and that the walls of its body, tapering gradually upwards without increasing in thickness, merge into the horn and tube.

Conception may take place in a uterus unicornis, and according to the observations of Chaussier (in whose case twins were born) Rokitsansky and Chiari, pregnancy may reach its normal termination (in Chiari's case it only extended to the 7th month). The rudimentary horn appended to the uterus unicornis may also become pregnant, even in cases where the junction with the normal one is solid, and therefore in those cases also where its canal neither communicates with the cavity of the uterus nor vagina; consequently in such cases to produce conception the semen must have penetrated through the normal horn and oviduct, to the ovary of the opposite side from which the ovum entered the rudimentary horn in the usual manner. The case of Czihak, cited by Kussmaul and also examined by many others, is remarkable for many reasons. There was found a left uterus unicornis and a right rudimentary horn, the uniting portion of which being solid, its cavity consequently had no communication with that of the uterus. In consequence of the presence of a six month foetus this rudimentary horn had ruptured. The corresponding corpus luteum was distinctly formed in the left and consequently the opposite ovary. Kussmaul was unable to use this case with regard to his theory of the transmigration of the ovum, according to which theory the ovum penetrates through the oviduct and

uterus into the opposite oviduct, he therefore contends that the corpus luteum may be absorbed and disappear (Kiwisch) and that consequently in Czihak's case, the corpus luteum connected with the pregnancy might have been in the right ovary and have disappeared without leaving any trace, and that that of the left side had no connection with the existing pregnancy. I am however, very much inclined to advance this case against Kussmaul's theory, for it seems to me to be rather arbitrary, to assume that only that corpus luteum connected with the pregnancy should have been absorbed, whilst another menstrual corpus luteum should have been so completely developed.

In monopodia and cases of unilateral pelvis, the uterus unicornis was found by Breschet, Heusinger and Vrolik, and in the siren monster by Cruveilhier and Otto. But the uterus unicornis is also found in well developed individuals. Sometimes in company with absence of the kidney and ureter of the corresponding side; in such cases the bladder is often of unilateral development. This, together with the fact that the kidney on the same side as the rudimentary horn of the uterus may be absent, renders the cases of Pole, Heusinger and Puech, exceedingly interesting. In these, from their description, there was found a congenital hydro-nephrosis on the same side as the undeveloped horn, which circumstance leads to the conclusion that perhaps the cause of the arrest in development should be looked for in a foetal disease, which in many cases might arise in the Wolffian duct, and involve the but recently developed Müller's duct. Schupmann found congenital hydro-nephrosis in a case of double uterus (*Organ f. d. gesamm. Heilkunde. Bonn. 1842. Bd. II. Hft. 1.*). Vrolik in one of uterus bicornis. (*Virchow, Ueber congenital Nierenwassersucht. Würzburger Verhandlungen. Bd. V. 1855*). Thiersch thinks that the uterus unicornis as well as bipartitus and bicornis are caused by the Wolffian bodies being too far apart and remaining so for a longer time than usual, and Rokitansky adds

(Ztschr. d. Ges. d. Ae. 1859. Nr. 33.) that absence of the kidney of the corresponding side, is sometimes caused by an excessive size of one of these bodies from obliteration of its excretory duct.

In lateral hermaphroditism we generally find only the uterus unicornis.

4. DOUBLE UTERUS.—UTERUS DUPLEX SEPARATUS, OR UTERUS DIDELPHYS (KUSSMAUL).

Literature: Palfyn, Descript. anat. de la disposition surprenante de quelq. part. ext. et int. de deux enfants etc. annexed to his Descr. anat. des part. de la femme, qui servent à la générat. etc. Leide, 1708.—V. Malacarne, Mem. di Matemat. e di Fisica dell. soc. Ital. delle scienze. T. IX. Modena, 1802. (Dihisteria, Dimetria).—J. Erhart, Medic. chir. Zeitung. Innsbruck, 1825. II. Bd. pag. 489.—Mayer in Bonn. (previously quoted).—E. L. Wedel, Diss. monstro. hum. rar. descr. continens. Jenae, 1830.—Hesselbach, Med. chir. Beobachtungen und Erfahrungen. I. 2. 1833.—Eschricht, Müller's Archiv 1836. pag. 139.—Rokitansky (previously quoted).—Otto (previously quoted).—Gruber, Mém. des savants étrang. Tom. VI.—Kussmaul (previously quoted).

UNDER the head of double uterus we find that form of arrest of uterine development described, in which a uterus unicornis exists on both sides, and which are distinctly separated from each other; such cases are caused by the separate development and non-coalescence of Müller's ducts. Between these two one-horned uteri the peritoneum does not intervene, but passes directly from the posterior wall of the bladder to the anterior wall of the rectum. These uteri are situated on both sides of the bladder, are considerably curved outwards, and generally incompletely developed. Thus transitory forms are produced between this anomaly and uterus bipartitus, as also where the horns are unequally developed, between uterus duplex and unicornis with a second rudimentary horn. Most frequently the lower half is deficiently developed and to each uterus a more or less developed ovary and oviduct is appended.

The vagina is frequently entirely absent, or imperfectly developed, and when present it is most always double. Some-

times both uterine halves terminate in a cloaca (Palfyn and Wedel).

Double uterus rarely occurs without some other anomaly of development or formation, but is frequently found co-existing with absence of the anterior abdominal wall, ectopia of the bladder, absence of the symphysis and cloaca formation.

Erhart mentions the unusual width of the face, in his case, and invites investigations of other cases in regard to this fact, (see page 27).

Kussmaul, whose statements I have made use of as being the most reliable in regard to this matter, mentions that up to the present time, the uterus didelphys is only found in still-born children, or in fœtuses that have died early.

The many instances reported of conception having occurred in cases of so-called double uteri, must be understood to imply those of arrested development which will be described under the head of TWO-HORNED UTERUS. That malformation which, according to Kussmaul, I have termed uterus didelphys, is only found in short-lived children.

I would recommend the term *uterus didelphys*, used by Kussmaul, as being the most proper, for the reason that there is in fact no duplicity apparent in such cases, but it is merely a separation of the double germ which constitutes this anomaly of development.

Voigtel mentions a case of triple uterus (Thilow, Beschreibung anat. patholog. Gegenstände. Gotha, 1804. B. 1. Th. 1. pag. 14.) which was probably a case of uterus didelphys and cloaca formation, combined with atresia of a rudimentary rectum, which latter, being closed after a short upward course, was mistaken for a third uterus.

5. TWO-HORNED OR BICORNUTED UTERUS. UTERUS BICORNIS.

Literature: May, *Commerc. liter. Norimberg*, 1733.—Gravel, *De superi foetatione conjecturae*. Argentorati, 1738.—Eisenmann, *Tabul. anat. quatuor uteri-duplicis observ. rar. sistentes*. Argentorati, 1752.—Bagard, *Mém. de l'academie des sciences*. 1752. pag. 111.—Voigtel, *Handb. d. path. Anatomie*. Halle, 1805. III. Bd. pag. 453 (older literature).—Meckel, (previously quoted) I. Bd. pag. 673.—Carus, *Zur Lehre von Schwangerschaft und Geburt*. III. Abthlg. 1824.—Ammon, *angeb. chir. Krankh.* T. 19. F. 13.—Geiss, *Rust's Magazin*. X. Bd. pag. 569. 1825.—Cassan, *Recherch. anat. et physiol. sur les cas d'utérus double et de superfétation*. Paris, 1826. Thèse.—Salert, *E. v. Siebold's Journ. etc.* IX. Bd. 3 pag. 736.—Mayer in Bonn. (previously quoted).—Rokitansky (previously quoted).—Fr. Schröder, *De uteri ac vaginae sic dictis duplicitatibus*. Diss. Berlin, 1841.—Thilo, *Uteri bipartiti descript.* Diss. Halae 1844.—Hohl, *Deutsche Klinik*. 1853. V. Bd. 1.—Kiwisch, *klin. Vortr.* Prag. 1854. I. Bd.—Krieger, *Monatschr. f. Gebk. u. Frauenkhh.* Berlin, 1858. XII. Bd.—Kussmaul, (in the work previously quoted, which contains the complete literature on the subject).—Rokitansky, *Ueber Atresie des Uterus und der Vagina bei Duplicität ders.*, *Zeitschr. d. Ges. d. Ae.* Wien, 1859. 33. und 1860. 31.—Stoltz, *Gaz. méd.* 1856. Oct. 40, and *Note sur le développement en complet d'une des moitiés de l'utérus et sur la dépendance du développement de la matrice et de l'appareil urinaire*. Strasbourg, 1860.—Hyrtil, *Handb. d. topogr. Anat.* 4. Aufl. 1860. II. Bd. pag. 206.—Förster, (in work previously quoted).

By the name of uterus bicornis is meant a uterus the horns of which, when viewed externally, are seen to diverge. Such cases occur in consequence of the incomplete coalescence of Müller's ducts, the incompleteness of the union commencing at the elevation of the internal orifice, or even a little higher. The coalescence is rarely so imperfect as to cause the divergence of the horns to commence at the cervix. In many cases there is an internal septum commencing at the point where the external union of both uterine halves is perceptible, which septum divides the cavity of the uterus and causes the internal division to extend lower down than is apparent from the exterior. Thus Kussmaul is right in making a distinction between two forms of uterus bicornis, according as the separation into two halves by a septum, descending from the point of union of the two

horns, is perfect or not. If the division of the cavity is complete Kussmaul terms it uterus bicornis duplex, but if incomplete uterus bicornis infra-simplex or semi-duplex.

1.—The *uterus bicornis duplex*, or as it might be better termed, the *uterus bicornis bicameratus* or *septus*, has been described by many as uterus duplex. It differs however, from that arrest of development which we recognize as uterus duplex, and which according to Kussmaul, to avoid misunderstanding, we will term uterus didelphys, in this particular, that both uterine halves always appear externally to be more or less united in their lower segments, whilst in the uterus didelphys they are completely separated, and often from one to two inches apart; in the uterus bicornis septus both halves more fully developed and rarely rudimentary, whilst as above mentioned, in the uterus didelphys they are generally rudimentary.

The uterus bicornis septus on the whole has a broader cervix than a normal uterus, both uterine halves of the body diverge exteriorly in the shape of clubbed or fusiform processes, and the size of the diverging angle of both horns is in direct proportion to the bicornuity. Consequently, in this malformation both primordial germs have been developed separately, and consequently we have a right and left uterus unicornis, whose lower segments have at some period approached each other and coalesced, and in consequence of which the bicornuity is more or less marked exteriorly. In such cases the two separated uterine bodies are of a similar anatomical character as the uterus unicornis.

Rokitansky mentions the singular disposition of the palmæ plicatæ. The anterior one is always internal and near the septum, the posterior one lies more externally. This corresponds with the circumstance that not only the normal fundus uteri but also the uniting portion representing it in such cases, and the septum which descends from it, is considerably thicker posteriorly than anteriorly. It is evident that this uniting portion

exerts considerable influence on both uterine halves in their relations to each other, and on the form of the cavity. The higher it is situated, and consequently the less the horns diverge, the more it assumes the character of a fundus uteri. In all cases it occupies a horizontal position at the angle where the horns meet (Rokitansky). In accordance with the greater thickness of the posterior part of the septum, which divides the cavity of the uterus into a right and left one, and on the other hand unites the two separated horns into a uterus bicornis, the fundus or uniting portion is more prominent posteriorly.

Anteriorly the uterus bicornis is slightly concave from above downwards, both halves gradually diverging. Its posterior surface is slightly convex (Rokitansky).

The vaginal portion of the uterus bicornis septus is either single (Gravel, May), and the septum which increases in thickness as it extends upwards, commences as a very thin membrane which divides the vaginal portion into two cavities; or each uterine half has a distinct vaginal portion, each of which is smaller than that of a normal uterus, but which together represent more substance than a simple normal vaginal portion. Generally the same may be said of both halves of the uterus bicornis compared with the normal organ, and no doubt these conditions have induced Rokitansky to consider this deformity, as due to an excess of development. With this opinion, however, I do not agree. I consider the uterus bicornis always the result of an arrest of development, even when it reaches that condition called uterus duplex; the effort of the formative action is undoubtedly to bring Müller's ducts together and cause them to coalesce; if this does not occur, as in the uterus bicornis, the formative action has been arrested. Meckel also considers bicornuity as dependent on arrest of development. It would be allowable, so far as regards the substance of the uterus bicornis, to say that it is the result of an excess of formation; but its bicornuity is undoubtedly the result of an arrest of develop-

ment, even if it should be demonstrated that before the coalescence of Müller's ducts, (consequently before the eighth week) muscular tissue had been formed in both halves and thereby hindered their union.

With increase in the breadth of such a uterus a corresponding diminution in length always occurs.

The vagina of the uterus bicornis septus is either single or double, the former is generally the rule when there is but a single vaginal portion, the latter is more frequently though not always the case where a double vaginal portion exists.

Although in most instances both halves of the uterus are equally developed, still, not unfrequently they are of unequal size. This inequality may be so considerable as to constitute a transition to the uterus unicornis with an appended rudimentary horn. In this category we might also include those cases described by Rokitansky as very important and rare, in which a congenital atresia of one-half of the uterus bicornis coexists with a single vagina.

Combined with uterus bicornis septus a very interesting anomaly has been described by Carus, Cassan, Rokitansky and others, consisting of a fold of peritoneum which, arising from the posterior wall of the rectum, extends between the uterine as a large falciform fold with the concave superior margin towards the fundus of the bladder, and always including the urachus. When this fold is very high (I have seen it two inches high in the middle, exactly above the uniting portion of both uterine horns), the pelvic cavity is apparently divided into right and left compartments, into each of which the body of a one-horned uterus, with tube and ovary, ascends. Krieger considers this ligamentous fold as a remnant of the allantois which, by its abnormal presence, hinders the development of the uterus and at the same time frequently occasions an abnormal attachment of the rectum to the posterior wall of the bladder, or the posterior fornix of the vagina, which attachment at a later period may disappear.

This has also been described as *ligamentum recto-vesicale*. Kussmaul considers it as a suspensory ligament of the uterus, and Rokitansky, as a compensation for the absence of the broad ligament at the inner side of each uterine body.

Conception may take place in each half of the uterus bicornis, and, in successive pregnancies, the foetus may be developed alternately in them. Hohl, Salert, and Geiss observed a foetus in each half of a uterus bicornis, and Bayard even found twins in one half.

When pregnancy occurs in one uterine cavity, its walls dilate and thicken in the same manner as those of a normal uterus. The impregnated horn ascends into the abdominal cavity, and when both horns are equally developed, the unimpregnated one occupies the same position as the pregnant, and its walls increase proportionately in thickness. If however, the pregnant horn is the more developed of the two, it ascends more or less vertically into the abdominal cavity, and the unimpregnated one is annexed to it laterally. Finally, if the less developed horn becomes pregnant, it often ascends obliquely into the abdominal cavity and the unimpregnated one sometimes occupies a perfectly vertical position. In most, though not all cases of pregnancy in one horn, the mucous membrane of the other is transformed into a decidua.

Although many instances are known where pregnancy reached its normal limits and resulted in normal birth, still, the existence of such an anomaly as bicornuity of the uterus, must be considered as unfavorable to pregnancy and delivery, and, according to Rokitansky, for the following reasons.

1st. Owing to the almost entire absence of the fundus uteri, contraction of which is of such importance in childbirth.

2d. The uterine tissue, constituting one horn, is of insufficient thickness, notwithstanding its increase during pregnancy, and when contraction comes on, rupture of the uterus easily occurs.

3d. Although the unimpregnated half generally increases in

substance during the pregnancy of the other, yet this does not take place to the same extent, and the septum being common to both, we may presume that the enlargement of the pregnant will be impeded by the opposite half. That this is the cause of habitual abortion in many cases, as Rokitansky asserts, is denied by Kussmaul, nevertheless the fact adduced by the former must, in my opinion, be considered as an unfavorable one, although Cruveilhier and Busch report cases in which the unimpregnated horn participated only slightly, or not at all, in the increase in size of the pregnant one and still the fœtus matured; on the other hand, cases with unfavorable terminations are universally known.

Kussmaul also denies the importance of the other two arguments of Rokitansky. He considers that if the fundus uteri was of such importance during delivery, in a case of uterus unicornis labor must necessarily be tardy; which is known not to be the case. That a diminution of substance exerts any influence on labor is refuted by Kussmaul, who proves that successful delivery has occurred in many such cases; still, in these instances he lays stress on the tardiness of the labor, which, in my opinion, is sufficiently accounted for by this condition. He however attributes this tardiness of labor to the deviation of the gravid uterine half from the axis of the pelvis and uterine body, a circumstance which is certainly deserving of consideration, but which does not lessen the importance of the reasons advanced by Rokitansky.

Instances of rupture of the uterine walls during labor are also recorded, and Busch mentions a case of uterus bicornis septus, in which an exhausting hæmorrhage occurred after delivery, in consequence of the attachment of the placenta to the septum, which not contracting, the vessels remained open.

We may here mention another remarkable circumstance observed by Erhart in a case of uterus didelphys; namely, a considerable breadth of the body coexisting with uterus bicornis septus (Carus, Rokitansky.)

We sometimes find combined with uterus bicornis septus, an incomplete development of the uropœtic system, and especially absence of the kidney (Schröder, Haller, Rokitansky, Stoltz).

2.—With Kussmaul we describe as *uterus bicornis infra-simplex*, or *semi-duplex*, or *unicollis*, that form of the uterus in which external duplicity is combined with duplicity of its cavity, but in which the cavity of the cervix remains single. If we refer to embryology, in such cases the lower extremities of Müller's ducts must have approached each other in the normal manner, and absorption of the septum from below upwards proceeded in the usual way up to a certain distance, whilst the superior extremities of Müller's ducts diverging more or less, were developed into separate uterine horns. Whilst the extreme degree of this bicornuity resembles in its external form the uterus bicornis septus with a single cervical cavity, the lowest degree is represented by a broader uterine body and fundus with distinctly diverging horns, and a whitish seam-like line extending from the anterior to the posterior surface. This line coincides with the septum descending from the fundus, and extending more or less deeply into the uterine cavity; at the same time the body is slightly dilated in its transition into the horns, which latter diverge more considerably than usual. The further distinguishing characteristics of the uterus bicornis septus are also found in a lesser degree in the uterus bicornis unicollis; in well marked cases of this anomaly, we sometimes find the recently mentioned fold of peritoneum, the *ligamentum recto-vesicale*. If coalescence of the horns takes place above the internal orifice so as to form only a slight depression at the fundus uteri with a mere trace of an internal septum, this form is termed by Kussmaul *uterus arcuatus*.

The unfavorable results of pregnancy and childbirth in this form of uterus, are increased in proportion to the degree of the abnormality. In consequence of the diminished thickness of the uniting middle portion, as well as of the septum, the

other uterine half participates at an earlier period in the expansion of the gravid one, and consequently the resistance opposed to the gravid half is lesser than in the uterus bicornis septus. The danger to the woman is therefore much lessened, and far more well authenticated cases are recorded of successive pregnancies and puerperal processes terminating favorably in such cases, than in those of uterus bicornis septus.

The lesser degrees of uterus bicornis infra-septus, or unicolis, in which the divergency of the horns is only indicated, and the uterine cavity distinctly divided by a septum, form the transition to the arrests of development hereafter to be described.

6. THE NON-HORNED SEPARATED UTERUS, UTERUS BILOCULARIS, (ROKITANSKY); UTERUS SEPTUS, (KUSSMAUL).

Literature: Gravel, De superfoetat. Diss. Argentor. 1738. — Eisenmann, Tab. anat. quat. ut. dupl. T. I. Fig. 1. Argentorati 1752. — Haller, Icon. uteri hum. in fasc. tab. an. II. F. 2. — Meckel, in work quoted — Meckel, Journ. f. anat. Variet., fein. u. pathol. Anat. Halle, 1815. Nr. 1. — Ammon, in work quoted, — 1. Vrolik, in work quoted. Balduin Kittel, Die Fehler des Muttermundes und Beschreibung einer Gebärmutter mit doppeltem äussern Muttermunde. Diss. Würzburg, 1823. — Otto, Seltene Beobachtungen etc. 2. Sammlung. 1824. pag. 141. — Kiwisch, Klin. Votr. I. Bd. pag. 92. — Cruveilhier, Anat. path. Livr. 4. Pl. 5. u. Livr. 13. pl. 6. — Leipmann, De duplicate uteri et vaginae, Diss. Berol. 1830. — Rokitansky, Kussmaul, Förster, in the works quoted.

THE non-horned separated uterus is one which externally appears single, but whose cavity is divided by a septum descending vertically from a more or less normal fundus, and by which division a right and left cavity is formed.

The origin of this anomaly must be sought for in a relative arrest of development, the two conjoined walls of Müller's ducts not having undergone involution, as in the case in the normal development of the uterus.

Externally such a uterus presents a slight increase in breadth; in many, a ligamentous strip or longitudinal ridge is seen ex-

tending along the median line from above downwards. This is more frequently observable on the posterior surface, although I have repeatedly seen such a whitish longitudinal prominence in uteri otherwise normal. Sometimes on the posterior surface of the bilocular uterus we notice a conical prominence, presenting the appearance of a facette.

We must avoid confounding this peculiar increase of the uterine substance with those alterations in the external form of a softened and flaccid uterus, caused by the pressure of the intestinal convolutions, and which closely resembles that form described by Meckel and Haller.

Kussmaul makes a distinction between the uterus *septus duplex* in which a uterus, externally single, is divided internally throughout its whole length by a septum into two lateral halves, and the uterus *subseptus*, in which the longitudinal septum is incomplete. This incompleteness of the septum is in its lower part, it descending from the fundus in different lengths, but never reaching the external orifice. On this difference in length of the septum, Kussmaul bases three distinct forms. If the septum reaches nearly to the external orifice, this variety he calls uterus *subseptus unifornis* with a single external orifice; if it extends from the fundus to the external orifice, it constitutes the uterus *subseptus unicollis*, and if the septum is only perceptibly developed at the fundus we have the uterus *subseptus unicorporeus*.

There are very instructive cases of incomplete separation of the uterine cavity belonging to this class, in which only the external orifice is divided into a right and left one. Kiwisch describes ligaments of uterine tissue varying in thickness which extend obliquely from lip to lip of the os externum, thus dividing it into equal or unequal halves. Förster considers this as an arrest of development, and I perfectly agree with him. Kussmaul has termed this very rare form, uterus *subseptus biforis, supra simplex*; such cases were also observed by d'Outrepont (Bald, Kittel), Otto and Kiwisch.

In the uterus subseptus unicolis the septum terminates in a concave border, the posterior portion extending lower down and merging more gradually into the posterior wall of the cervix than into the anterior.

To the class of uterus septus or subseptus we must also add those not unfrequent cases in which the septum is indicated by a prominent ridge, especially on the posterior wall, and generally with coexisting increase in the breadth of the uterus. I have also seen this rudimentary ridge on the posterior wall of the cervical canal.

In bilocular uterus the vagina is also often divided by a septum which may be of various lengths and is always a continuation of the uterine septum. Such cases are strong supports to the theory that not only the uterus and oviducts, but also the vagina, are developed from Müller's ducts.

In most cases of bilocular uterus the vagina is single, but even in these a rudimentary septum is sometimes indicated by a prominent longitudinal ridge on the posterior vaginal wall.

In all of the above mentioned forms of division of the uterine cavity, the external pudenda are generally well developed, though in rare instances, we find deficient development of these parts combined with the above malformations. Hyrtl's statement that no hymen is found in cases of divided uterus, has been disproved by Kussmaul by the description of several cases, some of which are known to myself.

In all these malformations of the uterus, menstruation occurs in the same manner as in the normal organ, and the menstrual flow proceeds from both or only one uterine half (Kussmaul). Both halves are also capable of impregnation, and a large number of recorded cases confirm this statement. There are fewer unfavorable conditions for pregnancy in these malformations than in the cornuted varieties.

It is my opinion that the classification contained in Kussmaul's elaborate work on these various forms of uteri, should be universally adopted. First, he commences with absence of

the uterus, next come the rudimentary forms, then the uterus unicornis. His double uterus unicornis constitutes the uterus didelphys, and the transition from this to the normal form, is established by the interposition of two intermediate forms, the horned and non-horned divided uterus. The uterus bicornis he makes either septus or unicollis, and so also the bilocular uterus. The further subdivisions however, made by Kussmaul are, I consider, too minute in their details.

7. CONGENITAL ATRESIA OF THE UTERINE CAVITY, ATRESIA UTERI CONGENITA.

Literature: Morgagni, *Adversar. anatom.* I. Tab. 3.—Böhmner, *Observ. a. p.* fasc. 2. p. 62. T. 7. — Meckel, *pathol. Anat.* I. pag. 662. — Kittel, *Die Fehler des Muttermundes etc.* Würzburg, 1823. — Leroy, *Journ. d. conaiss. méd.* Fevr. 1835. — Nega, *Dissert. de congenit. genit. femin. deformit* Vratislaviae, 1838. — Trumet, *Gaz. méd. de Paris.* 1851. T. VI. p. 34. — Kiwisch-kl. *Vortr.* 1854. pag. 113. — Décès, *Bullet. de la Société anat.* Juillet. 1854. — Santesson, *Preuss. Vereins-Zeitg.* 1857. 50. — Rokitsansky, *Ueber Atresie des Uterus u. der Vagina etc.* *Zeitschr. d. Ges. d. Ae.* Wien. 1859 Nr. 33 und 1860 Nr. 31. — Kussmaul, as previously quoted, pag. 36 a. 194. — Förster, *Missbildungen* pag. 132.

By congenital atresia we understand that arrest of development in which the external orifice, or at the same time a portion of the cervical canal is either imperforate or entirely absent. As the extremest degree of this anomaly we might consider that rudimentary form in which no cavity has been formed. However, the term atresia is only applied to the slighter anomalies just mentioned. Various theories may be adduced to explain the origin of this anomaly.

In those cases in which the vagina is absent, the lower portions of Müller's ducts were probably deficient from the beginning, or we may presume that the primordial germs of these canals were present and coalesced inferiorly without forming a cavity, consequently the result was a solid body varying in thickness, or a cord-like part uniting the rest of the well developed uterus with a rudimentary vagina.

In other cases an inflammatory action may take place at a late period of intra-uterine life, after the cavity has been normally formed, which will also result in a congenital atresia of the uterine cavity. It is evident that the distinguishing of such cases is exceedingly difficult, and it was only my intention to mention the three possible modes of origin. Kussmaul terms the two first *primitive atresia*, and those in which a foetal adhesion of the walls of the cavity took place, *congenital secondary atresia*. The last form would seem to constitute the only foetal derangement of nutrition known to us by its results.

The opinion that primitive atresia are the most frequent, is confirmed by the circumstance that congenital atresia are frequently combined with such arrests of development of the uterus and system, as, according to embryology, must have commenced at a very early period of foetal life.

Atresia presents some varieties of form.

The cervix of the uterus is in rare instances perfectly imperforate, and forms a slender cylindrical body consisting of fibrous connective tissue interspersed with muscular fibres. In such cases the vaginal portion of the cervix is either entirely absent, or very imperfectly developed and small, and the vagina is always rudimentary. In other cases the atresia is limited to the external orifice, the occlusion being also effected by muscular and connective tissues. In such, the vaginal portion is generally small, but in some instances it is found normally developed. Finally, we meet with cases in which the vaginal portion and cervix are perfectly permeable, but the atresia is formed by the mucous membrane of the vagina passing over and occluding the orifice of the vaginal portion.

In instances where the occluding tissue does not differ from that of the cervix and vaginal portion, the most probable assumption is, that in the primitive germ of the uterus a cavity was never formed in the portion affected with atresia.

Regarding the combination of this arrest of development

with other malformations of the uterus, the cases of atresia of one-half of a uterus bicornis described by Rokitansky, Leroy and Santesson, are so much the more instructive, as it would be impossible to explain the morbid derangements necessarily occurring at the period of menstruation without having recognized this complication.

The first case reported by Rokitansky was a uterus bicornis with the commissure at the level of the internal orifice. The left uterine horn was slender, thin-walled and conical, with a small vaginal portion implanted so eccentrically within the vagina, that a symmetrical right vaginal portion was found wanting in examining the fornix. (This reminds us of the condition of the fornix in uterus unicornis, and extra-median site of the uterus). The right uterine horn was comparatively very large, thick-walled, and its cavity enlarged, particularly its cervical canal, which was distended in the shape of a thin-walled capsule one inch in diameter, without any trace of communication with the vagina. The fornix of the vagina passed flatly over this capsule; the inner surface of the distended cervix was covered with cicatrices, and the right kidney was absent.

In Rokitansky's second case (1860) the uniting portion of a uterus bicornis was one inch below the insertion of the oviducts. The right half of the uterus communicated by a normal vaginal orifice with a single vagina. The left half was larger, the walls of its body of uniform thickness and moderately distended, the cervix was considerably dilated, and its inner surface covered with cicatricial depressions filled with ichorous matter. This capsular form of the cervix presented a fluctuating protuberance bulging from the left half of the uterus, into a single vagina belonging only to the right half. A narrow passage had perforated through the septum into the right uterine cavity, but there was no direct communication between this cavity and the vagina.

Rokitansky further describes a case of atresia, and one of

stenosis of the vagina, occurring in uterus bicornis ; a similar observation is recorded by Décès.

Leroy's case of enormous distension of one-half of a uterus bicornis imperforate in its lower portion, and extending up to the umbilicus like a uterus in the sixth month of pregnancy, is a very remarkable one. Santesson's case is very unintelligibly reported in Schmidt's Annals, which is also remarked by Kussmaul, and the original report I was unable to obtain.

Congenital atresia of the uterus in all its forms is a very rare anomaly. It may exist unperceived up to the years of puberty, and acquires pathological importance only at the commencement of menstruation. The menstrual fluid accumulates in the uterine cavity, from which it cannot escape, and consequently distending the uterus, it causes that condition with which we will become acquainted under the name of HÆMATOMETRA. Frequently enough congenital atresia by its consequences causes death.

Although a uterus affected with atresia cannot be impregnated, yet after a successful operation not only conception, but maturity of the foetus and a normal delivery, have been known to take place.

B. ANOMALIES OF PRIMARY DEVELOPMENT BY FORMATION ALTERED IN QUANTITY.

THE congenital anomalies of primary formation altered in quantity are only remarkable as regards the external conditions of the uterus ; the condition of the uterine tissue so far as known to this day, shows no alteration during foetal life. The anomalies to be described under the above head are either anomalies of the form or situation of the uterus.

I. CONGENITAL ANOMALIES OF FORM.

1.—OBLIQUITY OF THE UTERUS, OBLIQUITAS UTERI.

Literature: Morgagni, De sed. et caus. morb. Ep XXIX. art. 12. 20 Ep. XXXV. art. 16. Ep. XLVII. art. 18. — Ruysch, Obs. anat. chir. LXXXVIII. — Sandifort, Observ. path. anat. Lib. I, II und IV. — Voigtel, path. Anat. III. Bd. p. 463. — Tiedemann, Von den Duverney'schen Drüsen und der schiefen Gestalt und Lage der Gebärmutter. Heidelberg, 1840. — Meissner, Frauenzimmerkrankheiten. Leipzig, 1842. Bd. I. — Huschke, in Th. v. Sömmerring's Lehre von den Eingeweiden und Sinnesorg. des menschl. Körpers. 1844. pag. 534. — Velpeau, Annal. de thérapie méd. et chirurg, Paris. und Gaz. des hôpit. Nr. 2. 1845. — Kiwisch, klin. Vortr. II. Abschn. pag. 94 und Beitr. zur Geburtsk. etc. — Kussmaul (as previously quoted.) pag. 37. — Rokitsansky, Path. Anat. III. Aufl. III. Bd. pag. 455. 1861.

BESIDES those alterations of form to which the uterus is subject by the arrests of development hitherto described, there is another anomaly of form consisting of unequal development of the lateral halves, and which, in a certain sense, might be considered with arrests of development.

It may be assumed that one of Müller's ducts has been incompletely developed in length, thereby occasioning obliquity of the uterus.

The extreme form of oblique uterus would seem to be a transition to those arrests of development which we have described as uterus unicornis with an appended rudimentary horn, and especially to that species in which the cavity of the horn communicates with that of the uterus.

In such cases the body of the uterus is either thinner and inclined towards one side, and both horns with their corresponding oviducts diverge at the same elevation from the body, in which case one half of the uterus must be somewhat longer than the other; or, the oviducts diverge at a different elevation, in which latter case a considerable disproportion has occurred in the development in length of both halves. Rokitsansky describes as the most characteristic form of this congenital obliquity, that a uterus which has been formed by such a sliding of both uterine halves as to cause one horn with its

oviduct to be higher than the other, and also renders the vaginal portion correspondingly oblique. But this sliding is not the only cause of this alteration in form, for the longitudinal and substantial development of the half apparently situated lower down is likewise retarded.

The broad ligament of the rudimentary side is somewhat shorter, especially in its upper part; the vagina and os uteri lie in the median line, still the vaginal portion is sometimes so obliquely situated, that the half belonging to the more developed side is a little higher than the other, and at the same time broader and more substantial.

Sometimes this inequality in the development of both halves of the uterus seems to originate in the body, as I notice in the specimen before me:—From a normally formed cervix with a large and thick vaginal portion, an oblique and thick uterine body ascends in such a manner that the entire uterus appears bent at an angle corresponding with the internal orifice of the less developed half, whilst the more substantial right half shows a convex lateral margin. (Tiedemann, Rokitansky). In this specimen the lateral curvature to the left is in the body itself.

The oblique uterus is either situated in the median line, or, as is more frequent, its somewhat curved longitudinal axis is placed obliquely to that of the pelvis, in such a manner as to form an acute angle, opening upward on the developed side. On a more careful examination of such uteri it is also seen that their longitudinal axis does not form a right angle with their transverse axis, but that the upper angle is acute on the side towards which the fundus is inclined. This oblique form of uterus with oviducts diverging at the same elevation relatively to the pelvis, has been also termed oblique position of the uterus, and it has been asserted that this latter displacement is generally combined with obliquity of form; but this is incorrect in so far as that the uterus is always obliquely formed in this congenital obliquity of position, and I consider

such obliquity in form as the most essential point, and that of position as the secondary. For when a uterus is placed obliquely to the axis of the pelvis, either one half must be longer than the other, or they present that peculiar sliding condition described by Rokitansky.

2.—THE ANVIL-SHAPED UTERUS (KUSSMAUL). UTERUS INCUDIFORMIS VEL BIANGULARIS.

This form of uterus consists chiefly in a broader development of the fundus with outstretched lateral angles, and a corresponding shortening of the longitudinal axis of the whole organ. In the cavity of such a uterus two lines are seen converging at an acute angle towards the point of insertion of the oviducts, the superior horizontal one of the fundus being common to both the above-mentioned angles. This consequently would resemble a uterus in the fourth or fifth month of foetal life, and might be regarded as an arrest of development. This form it is said, predisposes to a transverse position of the foetus.

This anomaly is also said to be one of the rarest (Kussmaul).

Morgagni (De sed. et caus. mort. Eph. XLVII, Art. 33), mentions such a uterus with “fundi cavum in transversum amplificatum.”

II. CONGENITAL ANOMALIES OF SITUATION.

EXTRA-MEDIAN SITE OF THE UTERUS, SITUS UTERI EXTRAMEDIIUS, OBLIQUUS, METROLOXIA, HYSTEROLOXIA.

Literature: Cruveilhier, tr. d'anat. pathol. gen. I. p. 731. — Tiedemann, in the work previously quoted. — Mikschik, referat über Kiwisch kl. Votr. in der Zeitschr. d. Ges. d. Ae. zu Wien 1846. Octoberheft. pag. 509.

By the term *obliquitas uteri quoad situm*, that displacement of the uterus has hitherto been understood, in which its longitudinal axis lies parallel with, and to the right or left of the median line of the pelvis, the os being situated vertically below the fundus (Tiedemann). I prefer calling this anomaly *extra-median site of the uterus*, as I have observed that it is constantly being confounded with lateral inclination and obliquity

of the uterus. Lateral inclination represents what has been termed oblique position of the uterus, whilst in extra-median site the longitudinal axis of the uterus is not oblique either to the transverse or longitudinal axis of the pelvis; therefore the term oblique site is inappropriate.

The uterus, situated externally to the median line, generally retains its normal form, but the round ligaments are of unequal length, and the broad ligament of the inclining side of the uterus is shorter, and consequently the ovary of this side lies nearer the uterus. Frequently the inequality in length of the oviducts is out of proportion to that of the broad ligaments. In such cases the oviduct on the side of the shorter broad ligament is more serpentine than that of the other side. Very frequently the oviducts are equal in length, in which cases of course the same conditions are found on the side of the shorter broad ligament.

In this anomaly the vagina is usually found situated exactly in the median line, and the uterus implanted in it in such a manner that a right or left large sac and a right or left narrow slit are seen to form the fornix vagina. Mikschik attributes this congenital displacement to an arrest of development of one half of the fornix, because it is generally found combined with a contraction and flattening of that part of the fornix into which the cervix is implanted. This would, in my opinion, explain the deviation of the vaginal portion from the median line, but not that of the fundus, and an arrest of development of one half of the fornix might result in an oblique, but never in an extra-median site of the uterus.

According to Velpeau, extra-median site of the uterus occurs more frequently to the right than to the left, which may be owing to the circumstance of the rectum lying to the left. Kilian also remarks that the gravid uterus is always situated more or less to one side, generally to the right, both the os and fundus uteri occupying the same lateral position, whilst normally the os is turned to the side opposite that containing the fundus.

The anomaly of which we have been treating is of frequent occurrence, and must consequently be considered as a normal or nearly normal deviation of the uterus from the axis of the pelvis, caused by the extra-median site of the rectum in the pelvic cavity.

In very rare cases we meet with a genuine oblique site of the uterus, in which its longitudinal axis crosses that of the pelvis, and its fundus is inclined towards one or the other side. Properly this displacement is a secondary one; of the acquired form of this anomaly we shall speak under the head of LATERAL INCLINATION OF THE UTERUS.

Sometimes the uterus is found inclosed in a hernial sac, forming congenital hysterocele, this we will consider with ACQUIRED HYSTEROCELE.

III.—ANOMALIES OF UTERINE DEVELOPMENT DURING CHILDHOOD.

Literature: Morgagni, *De sedib. et caus. morbor.* L. III. Ep. 46. art. 20—22. — Voigtel (previously quoted.) III. Bd. pag. 462. — Meckel (previously quoted.) I. Bd. 677. — Lobstein, *Lehrb. d. path. Anat. Deutsch v. Neurohr.* Stuttgart. 1834. p. 66. — Duplay, *Ber. üb. die med. Klinik d. Prof. Rostan.* Nov. u. Dec. 1833 u. Jän. 1834. *Arch. génér. Mars.* 1834. — Kiwisch, *Klin. Votr.* — Virchow, *Weibl. Hermaphroditismus.* Würzburger Verhand. III. Bd. 1852. — Scanzoni, *Lehrb. d. Krankheiten d. weibl. Sexualorgane.* Wien, 1857. — W. Merkel, *Beitr. zur pathol. Entwicklungsgesch. der Genital.* Diss. Erlangen. 1856. — Recklinghausen, *Monatschr. f. Gebtsh. u. Frauenkhh.* Berlin, 1861. Bd. XVII. — Kussmaul (previously quoted.) — Förster, *Missbildungen.* pag. 161.

THE extra-uterine development of the uterus which coincides with puberty may become abnormal in two ways. On the one hand development may take place earlier than usual, and to this class partly belong those cases which we have already mentioned under the head of EXCESS OF DEVELOPMENT (page 7), in which not only the intra-uterine development of the uterus exceeded the shape and bulk of one at birth, but also those changes took place which usually we only observe at

second dentition or the commencement of maturity. On the other hand the energy of the formative action during maturity may lead to a result which we are obliged to consider as an excess of formation; but, according to experience, probably these conditions most always coincide with increased nutritive action, which latter must be considered abnormally increased. We shall treat of these conditions in connection with the other derangements of nutrition.

There is another class of anomalies of more importance which it is proper to mention under this heading, namely, those which we have recognized as having been caused by an arrest of formative action during puberty.

After Müller's ducts have been developed into a uterus, and after the septum separating the cavities of the two canals has disappeared, then, in the normal condition, development of muscular tissue takes place in the formerly membranous walls of the uterus; the still-existing disproportion, especially between the body and cervix, gradually disappears during the development of puberty, and the uterus increases in substance. Having previously treated of the arrests of development during foetal life, we will now consider the anomalies of this kind which occur during puberty.

Scanzoni describes as *uterus foetalis* such cases, where, in adult females, a cylindrical uterus is found, caused by a continuance of the disproportion between the body and cervix. The same author makes a distinction between this anomaly of development and smallness of the uterus, which may coincide with imperfect development of the entire generative apparatus. The cause of the latter arrest of development lies either in exhausting constitutional derangements, or diseases of the blood which may occur at the period of maturity. In the second form it is necessary to distinguish whether the retarded development of the uterus exists without complications, or simply as a partial phenomenon of the general development of the individual. In the first case the importance of this

anomaly to the female will be so much the greater, if the ovaries and oviducts show a normal development, and consequently, if menstruation and conception are rendered possible.

In the latter sense a small uterus belonging to a small person is also described as *uterus infantilis*, although in such persons it would be more surprising to find a comparatively large uterus. The dwarfed appearance of the uterus in such cases is only a partial phenomenon of general dwarfish growth, and needs no special mention. Kussmaul makes a nicer distinction between the two arrests of extra-uterine development termed *uterus foetalis* and *uterus infantilis*. The uterus foetalis has the form of that belonging to a foetus at full term. The body is small, six or nine lines in height, and ten to twelve in breadth; the neck, which forms the greater mass, is from eighteen to twenty lines in length. The cavity of such a uterus, especially that of the body (Duplay), is either wanting or is very small.

In those cases, however, which we regard as *uterus infantilis*, the organ, on the whole, has the form of a virgin one, but is altogether smaller; the most important anomaly is an excess of connective tissue in its walls, which renders them denser and more resisting; the mucous membrane is paler and thinner, and in many instances the rugæ of the cervical canal are imperfect. In the records of our institution I find a description of a uterus infantilis of a female *crétin*, evidently of advanced age (the exact age was probably unknown), in which folds of mucous membrane were found in the uterine cavity, similar to the *palmae plicatae*: unfortunately this specimen was lost. Kussmaul mentions a similar case of Barkow.

The vaginal portion of such a uterus is either very small or entirely absent; sometimes its presence is indicated by a wart-like prominence, with a slight depression, leading to the cervical canal.

In cases of *uterus infantilis* the organ and oviducts are generally very small, in the latter no Graafian vesicles are de-

veloped, and consequently menstruation or conception cannot take place. Sometimes, however, the oviducts and ovaries are so fully developed that their disproportion to the uterus is apparent at first sight; still in these instances also, as observed by all authors, the individuals had not menstruated at all, or very imperfectly. A peculiarly interesting case is Duplay's, which Kussmaul calls a case of uterus *foetalis imperforatus*, in which, notwithstanding the absence of both uterus and oviducts, distinct evidences of ovulation having taken place could be noticed in the normally developed ovaries, both ovaries exhibited dark spots and cicatrices (*corpuscula nigra*) on their surfaces, and in the left one there was a cavity six lines in diameter, filled with clots and lined with a serous-like membrane. There is no case known to me similar to this one of Duplay. In such the occurrence of uterine hæmatocele appears almost unavoidable, yet Duplay makes no mention of such an occurrence.

In uterus *foetalis* the vagina is generally very narrow, and without the usual rugæ; the inner labia are very small, frequently rudimentary (Morgagni), and the external pudenda seldom well developed. The breasts are either deficient or imperfectly formed. Virchow mentions the case of a virago with a penis-like clitoris, a long urethra, a *canalis urogenitalis*, and a uterus *foetalis* $1\frac{3}{4}$ inches in length, the cervix measuring over an inch.

Smallness of the uterus, resulting from imperfect development, frequently coincides with smallness of the heart.

Recklinghausen describes a uterus *foetalis* which was attached to the posterior walls of the bladder by pseudo-membranous adhesions, and he regards this attachment as the cause of the arrest of development.

Rokitansky mentions a case (Handbook of Pathological Anatomy, Vol. II. page 525) of abnormal smallness of the uterus, in which the cervix and vaginal portion were small in

consequence of retarded development; this condition is the more remarkable, as the uterus foetalis exhibits exactly the reverse proportion. In the latest edition of the above work this anomaly is not mentioned, and I have no knowledge of such a case. Kiwisch mentions analogous cases with well developed uteri, and very small vaginal portions; and Kussmaul terms such as *uterus parvicollis* and *uterus acollis*.

As Scanzoni remarks, there are a number of transitions, or varieties of development, between that arrest of development in which the uterus has remained in the condition of a membranous organ, and those cases in which a more or less virginal form, still with imperfectly developed walls, is observable, and which cannot well be described separately according to their different degrees.

The presence of a uterus infantilis, combined with other conditions favorable to conception, would seem to explain many cases of habitual abortion, and it is probable that many spontaneous ruptures of thin-walled gravid uteri must be attributable to this arrest of uterine development.

Lumpe mentions that the transformation of the infantile uterus into the form and size of a virgin one sometimes takes place very slowly and at a late period.

IV. ANOMALIES OF FORMATION IN THE LATTER PART OF EXTRA-UTERINE LIFE.

A. ANOMALIES OF FORMATION ALTERED IN QUANTITY.

THE result of excessive formative action, not altered in quantity, consists in an enlargement of the uterus, from increased development of elements similar in character and disposition to the physiological tissue of the organ. With the exception of an increase of its volume, the uterus retains all its other physical properties, and we call this condition *hyperplasia*, or *numerical hypertrophy*.

Taking the anatomical structure of the uterus into consideration in this properly called hyperplasia, the muscular tissue as well as the interstitial connective tissue must be affected simultaneously with excessive formation, and thus the relative proportion of both tissues in the enlarged uterus must remain normal. This explains the unaltered physical properties of the uterus, excepting its size.

As the opposite condition to the above, we must consider a kind of atrophy which causes a diminution and softening of the organ, in consequence of a low degree of formative action; this, in opposition to true atrophy, might be termed *aplasia*.

Both the above conditions agreeing in their external phenomena and predisposing causes, their consequences, with the results of excessive or diminished nutritive action, will be considered in the appropriate chapter.

B. ANOMALIES OF FORMATION ALTERED IN QUALITY.

In this chapter we will discuss those alterations of formation which relate to the external conditions of the uterus, namely, anomalies of position and form, and as regards the latter, especially those abnormalities which affect the form of the uterine cavity. Next in order will be those anomalies of formation which relate to the texture of the organ and are followed by productions which we comprehend under the collective name of adventitious growths.

I. ANOMALIES OF SITE OF THE UTERUS.

THE anomalies of position to which the uterus is subject by disease in extra-uterine life affect either the entire organ or only a part of it. In order to understand the controversies, which, from the oldest date, continue up to the present day between pathologists, in regard to the real causes of displacements of the uterus, it is necessary to clearly understand the attachments of the uterus, its position, and its relation to the other organs of the pelvic cavity.

If, on opening the abdominal cavity, we proceed from the anterior pelvic walls toward the uterus, we first meet with the round ligaments, which are correctly considered by some authors, to be direct continuations of the uterine tissue. Each round ligament, according to Rokitansky, divides at its uterine extremity into two branches, each of which diverges upward and downward on the anterior surface of the uterus. These divisions, conjointly, enclose a diamond-shaped space, at the lower angle of which is attached an arch-like bundle of fibres two lines in breadth, with the convexity of the arch directed downward; the ends of these arched fibres descend along the lateral margin of the cervix uteri toward the fornix vaginae, thus securing the duplication or invagination of the genital canal at the top, which corresponds beneath with the excavation of the fornix. The round ligaments with their muscular filaments allow the uterus to rise and fall freely, and, at the same time permit the fundus to approach the symphysis pubis, while, nevertheless, they can oppose with considerable resistance any considerable backward displacement of the organ. But, as the course of the ligaments is a convex bend anteriorly and exteriorly, the uterus may be displaced without causing traction upon them until the above mentioned bend is stretched, a traction of the round ligaments being borne so much the easier since they are attached below to soft parts (fatty tissue of the labia). Notwithstanding, I perfectly concur in the opinion that the round ligaments contribute somewhat to the fixation of the uterus, and are not to be considered as mere remnants of the *Gubernacula Hunteri*. It might be presumed that the round ligaments are only means of fixing the uterus in its position so long as they have not been stretched or become less resistant. But, although they are considerably stretched by the ascension of the gravid uterus, still, after the puerperal state, and the termination of the involution of the uterus, they resume their former length and resistancy, and I cannot believe that the possibility of traction after pregnancy

will now be lessened, or that the resistance which these ligaments might previously have opposed to certain displacements should now be entirely abolished.

The peritoneum of the uterus is formed by a fold transverse to the pelvic cavity from right to left, and vertical to the outlet of the pelvis, and into this fold the uterus is implanted from below. The above membrane passes from the posterior surface of the bladder, in the region of the basis of the trigonum (Langer), toward the uterus, at about the elevation of the point which forms the limit between the body and the neck, and consequently corresponding exactly with the internal orifice of the uterus. From thence the peritoneum, ascending on the anterior surface, passes over the fundus and covers its posterior wall. It then extends still further downward, so as not only to cover the posterior surface of the cervix, but also, in many cases, that part of the vaginal walls which form the posterior fornix. Then the peritoneum ascends upwards posteriorly over the posterior walls of the pelvis when it becomes the parietal layer. Thus it has lined the so-called Douglas' sac between the uterus and rectum. From behind the rectum, mostly deviating to the left from the median line, is seen to bulge to such an extent that about two-thirds of its circumference is covered by the peritoneum; but this frequently varies, and the rectum is often seen situated in the median line or even to the right of it.

At both sides of the bladder fibrous lines of the pelvic fascia pass from the os pubis along its lateral walls, to the point of transition of the body into the cervix uteri, and are called by Hyrtl *ligamenta pubo-vesico-uterina*. These ligaments, however, are mostly indicated by delicate outlines, especially in comparison to their antagonists which we will next mention. On both sides of the rectum two thick fibrous bundles of the hypogastric fascia extend towards the posterior surface of the cervix, forming an arch with its concavity looking inwards, and sometimes raising the peritoneum of the utero-rectal space

in the shape of two distinct semilunar folds, which are particularly apparent when the rectum is full, and which have been called by Madame Boivin and Duges *ligamenta utero-sacralia*. These prominent falciform peritoneal folds sometimes divide Douglas' space into a large upper portion opening into the abdominal cavity, and a smaller lower one; this is still more distinct when a small transverse fold passes across the posterior surface unites both the lateral folds, as I have often seen.

As I have mentioned, these utero-sacral ligaments, [in my opinion, are the antagonists of the pubo-vesico.uterine and the round ligaments. They prevent an excessive movement forward of the cervix, and, at the same time, a deviation of the fundus backward and the fact that they are subject to a greater tension when the rectum is full, leads me to suppose that in the latter condition a pressure of the cervix towards the neck of the bladder, otherwise unavoidable, is rendered impossible, and that undue expansion of the rectum, which, in this region is situated in the median line, is prevented, and the organ is necessitated to develop itself more laterally, because the attracted cervix opposes a solid obstacle to its extension forward.

Virchow demonstrated that both these duplications of the peritoneum are continued as two strong fibrous bundles, which, varying in size in different individuals, insert themselves into the posterior surface of the cervix uteri, converging towards each other, and generally meeting below the region of the internal orifice, or sometimes disappearing in the sides of the uterus.

The lateral portions of the large duplication of peritoneum into which the uterus is implanted are known as the broad ligaments. They certainly contribute somewhat to the maintenance of the uterus in its upright position in the pelvis, although their assistance must seem inconsiderable considering the great elasticity of the peritoneum.

The broad ligaments by their breadth certainly prevent, to a certain extent, any inclination of the uterus to the right or left, whilst they can oppose but little resistance to an inclination

forward or backward, because of their elasticity at their point of transition into the parietal peritoneum.

Independently of these ligaments, we must acknowledge that there is a further cause for the position of the uterus in the anatomical condition of its tissue, as well as the manner in which the organ is inserted into the vagina.

If we suppose the uterus and vagina to be one canal, to which assumption we are led by embryology, we must explain the formation of the vaginal portion and fornix by a slight invagination of the genital canal at the limits of the uterus and vagina, the receiving part being the upper portion of the vagina, the part received being that duplication of the canal which forms the vaginal portion of the cervix.

After many investigations made, and uninfluenced by either of the opposite opinions, I must state my views as follows:

The several membranous layers of the vagina are merged, with more or less modification, into those of the uterus. The vaginal mucous membrane is covered with pavement epithelium and contains numerous papillæ. This papillary structure is also recognizable on the vaginal portion and os uteri. From this point the mucous membrane becomes thinner, so as to form a very delicate layer in the interior of the cervix; in this part, also, it loses its papillary structure, and rises in transverse folds which unite on the anterior and posterior walls in a longitudinal elevation, forming the *palmæ plicatæ*. The mucous membrane of the cervix is covered with cylindrical epithelium, the cells of which become shorter as they line the larger ducts of the mucous glands, which latter are found in great numbers at the internal orifice.

Commencing from the inner os, the mucous membrane again becomes thicker, softer, and covered with ciliated epithelium, and bearing a relation to the utricular glands similar to that of the stomach to its glandular elements it gradually merges into that lining the oviducts.

The submucous tissue of the vagina is a very loose connec-

tive tissue, with large meshes, which suddenly become denser at the vaginal portion, especially at the lower end of the invagination of the cervix. From this point it becomes a very resistant, dense, fibrous, connective tissue, which, especially in the cervix, toward the internal orifice, acquires its greatest thickness and a nearly callous firmness. From the internal orifice upward, this layer gradually grows thinner, but still continues up to the fundus as a dense submucous stratum; but, suddenly becoming thinner, it merges into the delicate submucous stratum of the oviducts.

Virchow declares this to be entirely erroneous, but describes, in absolutely the same sense, those conditions which we have just given, namely, a diminution of the number of muscular fibres of the fibro-muscular uterine tissue as it approaches the mucous membrane, ending in a distinct, tolerably dense, but, in the normal condition, inconsiderable sub-mucous stratum. It cannot be doubted that the thickness of this stratum varies in different individuals; but even within the normal limits it may be tolerably thick.

This submucous layer, which consists almost entirely of connective tissue, with comparatively very few elastic fibres, forms the turning point of the difference of opinion in regard to the predisposing causes of uterine flexions, between Rokitansky and Virchow. Rokitansky considers this tissue to be the very framework of the uterus, and which enables it to constantly maintain its position in the pelvic cavity. In his article on the uterus and its flexions (*Allg. Wien. Med. Zeitg.* 1859, No. 17), an erroneous expression has crept in, which has given rise to misunderstandings.*

Under the loose submucous stratum of the vagina there is

* "The mucous membrane of the vagina is transformed into the thick, callous membrane of the cervix, of which it forms the principal mass." In the *Clinique Européenne*, Paris, 1859, No. 17, the above reads as follows: "*La muqueuse du vagin se transforme en celle du col de l'utérus qui est plus épaisse et presque calleuse.*"

an external thin muscular layer, a part of which only becomes involved in the duplication of the vaginal portion. It divides into an inner and outer layer, and the fibres of the latter immediately merge into those muscular fibres which, according to Rokitansky, we have mentioned as descending from the round ligaments. The inner layer, however, which enters the vaginal portion, becomes considerably thicker, ascends as the muscular layer of the cervix, and is traversed by thick ridges of connective tissue, which arise in the submucous cervical layer and extend outward. Higher up the muscular coat increases in thickness, so as to form the principal mass of the uterine body and fundus. In the latter it is traversed by slender segments of connective tissue, which likewise arise from the submucous connective tissue, and, meeting at the external part of the organ, form the subperitoneal layer of connective tissue, which, in its normal condition, is generally quite thin. Toward the oviducts the muscular coat of the uterus suddenly diminishes in thickness, and loses itself in their tissue.

The whole genital canal, in its normal condition, forms two angles, both of which open anteriorly. The superior one is situated at the internal orifice, and, consequently, at the junction of the body and cervix uteri, and measures about 165 degrees, whilst the inferior one is between the cervix and vagina, and measures about 155 degrees. The vaginal portion is in a line with the rest of the cervix, therefore the os tincae occupies an eccentric position in the vagina, being directed posteriorly.

The uterus being fastened in the position mentioned, the constancy of the superior angle depends on the firmness of its tissue, especially of the submucous layer above mentioned; but the constancy of the inferior angle depends on the ligaments of the organ, and the condition of the pelvic fascia.

The displacements to which the uterus is liable in its normal condition are rendered possible by its mobility, however

slight, at the points mentioned; and they are occasioned by degrees of distension of the bladder on one side and the rectum on the other.

The anterior surface of the cervix is attached to the inferior surface of the neck of the bladder by a loose connective and fatty tissue. As is well known it possesses no peritoneal covering. When the bladder is distended the cervix is depressed somewhat downward and more backward, owing to its easier deviation posteriorly than inferiorly; and when the bladder is greatly distended, the peritoneum of the vesico-uterine excavation, lifted by the posterior wall of the bladder during distension, partly draws the uterus upward. Virchow argues that in consequence of the displacement of the cervix backward, and from shortening of the round ligaments or pseudo-membranous adhesions between the uterus and the posterior walls of the bladder, which, in a like manner, prevent deviations backward, anteflexions of the uterus may occur so much the easier, as this point is fixed somewhat at the duplication of the peritoneum, which is situated exactly on a level with the internal orifice. In my opinion flexions of the uterus at the superior angle are dependent on very different conditions.

Virchow positively denies that a relaxation of tissue is always found at the point of flexion, and that when found it is a primary condition. The former statement may indeed be doubtful and the latter cannot be proved. When treating of the different forms of displacements I shall revert more particularly to the general and special arguments in favor of this assertion.

In general we distinguish between the following acquired displacements of the uterus.

1. The superior normal angle between body and cervix becomes smaller; or the angle which normally opens forward is straightened; or the fundus and body may be flexed in an opposite direction to the cervix, so that finally there is an angle formed at the same point, opening posteriorly. In many

cases the relative position of the body to the cervix is altered in such a manner that an angle is formed which opens on either side, these cases, however, are less frequent. These deviations in the region of the internal orifice are termed flexions. The original horseshoe-shaped curve of the longitudinal axis of the uterus, cervix and vagina, forming, in its normal condition, an angle of 165 degrees, is transformed into a nearly rectangular flexion, or finally into an infraction, as we term the highest degree of this anomaly.

Virchow opposes this distinction between infraction and flexion, and is quite right in asserting that it will depend on the resistance of the uterine tissue, whether the uterus be bent in the shape of a bow, or at an angle; and it is perfectly evident that if the relaxation of tissue be limited to the point of flexion, an angular deviation or so-called infraction will result, and that if the relaxation extends further, perhaps over the entire organ, a bow-shaped curvature will take place. This is the reason why the so-called infractions occur more frequently in young persons, and bow-shaped curvature in older and wasted women, and also after the puerperal state.

2. The uterus as a whole deviates from the median line of the vagina, and consequently changes its former normal position in the pelvis, becoming inclined. If we consider the uterus and vagina together as the genital canal, the inferior angle, normally situated between the cervix and vagina, is either diminished, or straightened, or opens toward the opposite side. These displacements we term *versions*, and distinguish according to the direction the fundus uteri has taken, between inclination forward—*anteversion*; inclination backward—*retroversion*; and lastly, lateral inclination to right or left—*right or left lateral version*.

3. The uterus is displaced in the axis of the pelvis, upward or downward, it either ascends from, or descends towards the outlet of the pelvis; we therefore consider the elevation an anomaly of not much importance; the opposite much more

important condition is termed sinking or descent of the uterus, which, in its highest degrees, forms one of the most important and frequent affections of the uterus—*prolapsus uteri*.

4. Next in order we shall consider *inversion* of the uterus.

5. Lastly, another displacement is constituted by the displacement of the uterus into hernial sacs: *hysterocele* in its various forms.

I. FLEXIONS OF THE UTERUS.

Literature: Saxtorph, Collectanea. societ. Havn. 1775, Vol. II. Nr. 32. — Denman, Introduction to midwifery. London, 1801 und 1827. — Schweighäuser, Aufs. über einige phys. u. pract. Gegenstände der Geburtsh. Strasburg, 1817. — Walshe, The Lancet. 5. Jan. 1839. — Tiedemann (in the work quoted). — Simpson, Monthly Journ. etc. July 1843, Dublin Journ. May 1848, Obstetric memoirs and contrib. Edin. 1855. pag. 199. — E. Rigby, Med. Times. Novbr. 1846. — Bell, Monthly Journ. Septbr. 1848. — Virchow, Über die Knickungen der Gebm. Verh. d. Ges. f. Geburtsh. Berlin. IV. pag. 80, Gesammelt. Abhandl. etc. Frankfurt, 1856, Wiener allg. med. Zeitung. 1859. Nr. 4. 5. 6. und 21. — Verh. der Ges. f. Geburtsh. Berlin. 1859. 3. u. 4. Bd. XIII. — Velpeau, Gaz. des hôpit. 1845. Nr. 82, Revue méd. chir. 1849. Decbr. — Deville, Sur la fréquence des anté- et rétroflexions de l'utérus. Rév. méd. chir. 1849. Decb. — Bullét. de l'acad. nat. de méd. XV. 2—10. — F. C. Sommer, Beitrag z. Lehre von den Infractionen und Flexionen der Gebärmutter. Diss. Giessen. 1850. — Mayer, Verh. der Ges. f. Geburtsh. Berlin. IV. 1851. — Rockwitz, Verh. d. Ges. f. Gebtsk. Berl. V. pag. 82. 1842, and Dissert. de antefl. et retrofl. ut. Marburg, 1851. — Dechambre, Gaz. méd. de Paris. 11. 1852. — Boulard, Rev. méd. chir. Juin. 1853. — Latour, Des déviations de l'utérus. L' Union. 1854. Nr. 18. — Depaul, Gaz. hebd. 1854. May. Nr. 34. — Scanzoni, Beitr. z. Geburtsh. u. Gynäcolog. 1854. I. pag. 40 and 1855. II. pag. 151. — Rokitsky, Wiener allg. med. Zeitg. 1859. Nr. 17. u. 18. — B. Dunal, Etudes méd. chir. sur les déviations utérines. Paris. 1859.

THE longitudinal axis of the uterus, in the first degree of flexion, is bent in such a manner that the normal angle becomes larger, or is straightened, or a slight curve takes place in the opposite direction. In the higher degrees of flexion the uterus is bent, in its longitudinal axis, anteriorly or posteriorly in the shape of a horseshoe. In the highest

degrees, the body of the uterus is flexed upon the cervix so as to form an angle; these highest degrees, or complete flexions, were formerly distinguished from simple flexions.

In the great majority of cases the flexion takes place at the level of the internal orifice (Walshe, Rokitansky, Virchow). Ashwell and Bell make the point of curvature to be generally above the limit between body and cervix, which fact I cannot confirm. It is exceedingly rare to find the upper part of the cervix participating in the curve, thereby causing the angle of flexion to be located between the internal and external os. I lately met with a case of retroflexion in which the angle of flexion was in the body itself, which is the only one known to me, and to which I have been unable to find an analogous one recorded. When the point of flexure is in the cervix, as a matter of course the angle is always nearer the inner than the external os. According to the direction in which the upper portion of the uterus is deflected from the lower, we distinguish between *anteflexion*, *retroflexion* and *lateroflexion*.

The angle of flexion, with but few exceptions, being located at the same point, the predisposing cause of it may be theoretically explained in two ways. If the cause of the erect position of the uterus be supposed to lie in the organ itself, from the rigidity and firmness of its tissue, then alterations of its texture at the point of angle, must constitute the cause of the displacement of that portion of the uterus which is less firmly supported; its body and fundus. But, if the cause of the normal position of the uterus be found to lie in conditions external to the organ, consequently in the attachment of its neck or ligaments; or, if circumstances arise which may cause a deviation of the upper portion of the organ—by abnormal traction or pressure—then the cervix, up to the point of flexion, must be supposed to occupy a relatively firmer position, or to be more strongly fixed. In the confirmation of these theoretical suppositions by anatomical investigations, the causes of flexion are rendered evident.

A. ANTEFLEXION OF THE UTERUS.

Literature (besides the works quoted in previous chapter): Denman, Walshe und Simpson, (in works quoted):—Ashwell, A practic. treatise on the diseas. pecul. to women. Lond. 1845. Oppenheim's Zeitschr. 1486. März. — J. Bell, Monthly Journ. July 1848. — Rockwitz, Boulard. — Duncan, On the displacements of the Uterus. Edinburg 1854. — Virchow, Rokitansky, (as previously quoted.)

UP to the commencement of puberty the uterus is neither bent forward or backward, only at the development of that period does it assume a slight curve forward, the angle of the curve coinciding with the level of the internal orifice, and in consequence of which the organ corresponds to the convexity of the posterior wall of the bladder. The cause of this normal anteflexion seems to me to lie in the unequal development in substance of the uterus at the period of puberty. It is chiefly at this time that the development of what we have described as a dense submucous stratum commences, and Rokitansky observed that this tissue is more considerable in the posterior semicircle of the internal orifice, consequently the anterior wall of the uterus must deflect to a certain extent.

In anteflexion, the fundus is situated more anteriorly, deflecting with the body from the cervix at the level of the internal orifice. In the higher degrees it descends more and more anteriorly, but, as the vesico-uterine excavation extends only as far as the level of the internal orifice, which is the point of flexion, a further sinking of the fundus would be impossible if this peritoneal sac was not at the same time increased in depth. This latter circumstance is due to the pressure of the fundus on the peritoneum, which, owing to its elasticity, and the looseness and elasticity of the subperitoneal cellular tissue, readily yields to its weight. It is also partly and chiefly owing to the fact, that the cervix in anteflexion always ascends somewhat in the pelvic cavity, thereby causing the superior portion of its anterior wall to become invested with a peritoneal covering. In the highest degrees of anteflexions, in

which the deflection of the body from the cervix is very considerable, forming a very acute angle, the fundus lies below the level of the internal orifice, of course anteriorly.

Concerning the causes of ordinary anteflexion, the opinions of Rokitsansky and Virchow have quite recently been in direct opposition to each other. The former attributes anteflexion to an internal cause, namely a relaxation or flaccid condition of that dense submucous connective tissue which he considers to be the framework of the uterus, especially at the level of the internal orifice. He considers this relaxation to be caused, (1) either by a catarrhal affection of the uterine mucous membrane, nearly in relation to a menstrual process, and accompanied with elongation of the utricular glands, and an inward growth of the same into the submucous stratum in the region of the internal orifice and cervix, in consequence of which the above mentioned stratum becomes atrophied; or, (2) as we have frequently observed, an excessive growth of the so-called ovulæ Nabothi takes place, which, from their increased size and consequent pressure, cause the submucous stratum to become atrophied, and which ultimately bursting, thereby cause a collapse of tissue in the formerly dense framework of the uterus, leaving in its place a flaccid net-like areolar tissue incapable of sustaining the organ in its normal position.

Both the above processes occur quite frequently, and must be considered as at least predisposing causes of flexions. That in consequence of these conditions anteflexions occur more frequently than retroflexions, is explained by the fact already mentioned, that the uterus in its original normal condition exhibits a slight anterior curvature, and furthermore, by the fact that the submucous stratum spoken of, is much thinner at the anterior semicircle of the internal orifice than at the posterior, and consequently is more readily atrophied.

Virchow denies the existence of a thick submucous stratum in the normal state, and asserts that it is not the thick callous submucous stratum of the cervix that supports the uterus, but

its fibro-muscular parenchyma, which has nothing to do with the mucous membrane. But the muscular portion of this parenchyma certainly is not the cause of the rigidity of the uterus, but, on the contrary, the fibrous portion; and it is precisely this stratum which Rokitansky has described as the framework of the uterus.*

Virchow, on the other hand, considers the relaxation and atrophy of this stratum as a consequence of flexion, or the result of the pressure at the point of flexion. According to this author the cause of ante flexion is to be sought for either in a relative shortness of the round ligaments, or in false membranes attracting the fundus forward, and preventing its displacement backward. The cervix is the most firmly fixed portion of the uterus, being attached to the posterior wall of the bladder, and its positions are dependent upon this attachment. According to Virchow, if the bladder is much distended the cervix is pressed backward, and the fundus, being adherent, must necessarily bend at the point corresponding to the level of the internal orifice, which would constitute ante flexion.

I agree with Rokitansky's opinion so much the more, as the possibility of ante flexion, originating from pseudo-membranous traction of the fundus, or from shortening of the round ligaments, has not been denied, but it is my opinion that under the circumstances mentioned, an ante flexion will occur so much the easier if the supporting tissue of the uterus in the region of the internal orifice has undergone the change mentioned by

* Rokitansky in his description of the callous mucous membrane includes the submucous stratum, which he considers as belonging to it, as I am enabled to state from his remarks. His description is however by no means absolutely false as Virchow states, but has been misunderstood, owing to a certain indistinctness in his expressions. It is decidedly correct that the stratum mentioned varies in thickness, but any one may convince himself that its average thickness is sufficient to afford a certain firmness to the uterus, and the absence or rudimentary condition of this stratum must in my opinion be considered abnormal.

Rokitansky. Where this is not the case, the attachment of the cervix at its upper portion seems to me to be insufficient to cause flexion at this point and I believe that with a normal firmness of the tissue in question, the uterus generally possesses too much rigidity in its longitudinal axis to be easily deflected at the point, where that stratum most capable of resistance, is proportionately thickest. On the contrary, it seems to be more likely that false membranes, or short ligaments, will attract the fundus forward or keep it fixed anteriorly, and thereby cause a certain amount of pressure on the fundus of the bladder, when the latter is full. The bladder must therefore of necessity distend more in that portion of its anterior wall which corresponds to the trigonum, thus causing the lower portion of the cervix uteri to be pressed backward, whilst the whole organ is elevated. Under these circumstances, if the region of the internal orifice be firmly fixed, the uterus must necessarily be rotated around a supposed transverse axis, and such conditions, whilst insufficient to cause anteflexion, will be followed by *anteversion*.

The cervix in anteflexion always deviates posteriorly, consequently the vagina is elongated by a slight stretching. The os uteri points a little backward, and, after anteflexion has existed for a certain time, the vaginal portion flattens somewhat in its antero-posterior diameter, and especially on its posterior lip an oblique surface is observable, formed by pressure of impacted faecal matter in the rectum (Virchow).

In consequence of the bending of the uterus its cavity is narrowed at the point of flexion, or it may be entirely occluded. A collection of mucus in the body and fundus must therefore take place so much the sooner, as the mucous membrane is generally affected with hypersecretion in consequence of a previous or existing catarrh; or, if this has not occurred, the passive hyperæmia existing at the internal orifice, in consequence of pressure and traction of the broad ligaments, must produce a hypersecretion of the mucous membrane in the

deflected part, which in both instances often causes a very considerable distention of the uterine cavity. The menstrual fluid may likewise collect in and distend it.

A further consequence of venous hyperæmia, arising from hindered reflux of blood at the point of flexion, is œdema, with tumefaction and genuine hypertrophy of the body of the uterus. The reflux of blood from the uterine to the hypogastric veins is interrupted, and in consequence of the collateral hyperæmia, frequently a very considerable dilatation of the *plexus pampiniformis* takes place, because the blood can now only flow through the spermatic vein.

Undoubtedly, in many cases of antelexion, hyperæmia of the oviducts and ovaries, catarrh of the oviducts and œdema of the ovaries result in consequence of the derangements of circulation just mentioned. Some authors also mention a combination with chronic *oophoritis* (Mayer).

Owing to the pressure occasioned by the anterior deflection of the fundus uteri, as well as the stretching of the peritoneum combined with the hyperæmia affecting it, peritonitis frequently sets in, and is often followed by pericystitis. If the uterus is not immediately replaced, the inflammatory action in the peritoneum causes the formation of false membranes, which, added to those perhaps already existing, by their subsequent retraction fasten the uterus in its abnormal position. The fundus uteri now presses still more upon the posterior wall of the bladder and hinders its dilatation, especially in those cases in which hypertrophy, or dilatation and consequently enlargement of the uterus has taken place.

We may make a distinction between a perfect and imperfect degree of antelexion, the latter has also been termed *inclination* of the uterus (Meissner). However the distinction between them is arbitrarily drawn.

As illustrating a peculiar cause of antelexion, I must mention a case observed by myself. The subject was an old woman with a flaccid antelexed uterus, in the posterior wall of which

a tumor filled with blood was found immediately above the internal orifice, occupying the entire thickness of the wall and considerably increasing its thickness. As I shall demonstrate at the proper place, this tumour had probably originated from the point of placental insertion. In this case it was an undue elongation and turgescence of the posterior wall which caused ante flexion ; moreover there was no trace of peritoneal false membranes.

Anteflexion is of more frequent occurrence than retroflexion ; but it never occurs before the development of puberty, and rarely at an advanced age. Where we find ante flexion in an old female, the whole uterus is generally flaccid and thin-walled ; in general the characteristics of the *marastic uterus* afterwards to be described, are distinctly noticeable. Generally in such cases, atresia of the uterine cavity is found at the point of flexion, sometimes combined with a cicatricial retraction of the atrophied stratum of connective tissue. In such the uterine cavity is more or less, but seldom considerably dilated and filled with a mucilaginous viscid liquid of a pale yellowish or brownish color.

In aged women with exceedingly relaxed uteri, the pressure of the intestines upon the posterior surface of the organ is sufficient to cause ante flexion. Rokitsky mentions a very remarkable circumstance, namely, that in women who have borne many children, quite a large transverse vein is found in the anterior semicircle of the uterine substance around the internal orifice, and which renders the uterus still more liable to flexion. I have repeatedly found this vein more than one, and sometimes one and a half lines in diameter. Sometimes a second smaller vein is seen above and parallel to this one.

The first mentioned vein forms a constant anastomosis between the venous plexuses of both sides, and it is certain that after each pregnancy it is left more considerably distended than previously. According to Rokitsky this vein is situated in

the anterior semicircle of the internal orifice, and is frequently formed by the confluence of smaller veins of the inferior and external portion of the utero-vaginal plexus; it also receives another large vein, originating in the broad ligaments, from the internal spermatic plexus and having an oblique course downward and inward. This anastomosis always occurs at the point when the peritoneal covering of the broad ligament diverges at the lateral margin of the uterus in order to cover the organ, and the venous trunk thus formed enters the uterine substance, receives smaller branches from above and below, and unites in the median line of the uterus with that of the other side. Frequently this anastomosis is not transverse but oblique, generally from the right and below, to the left and upward. I have always found this vein a little above the level of the internal orifice.

When ante flexion is so considerable as to nearly obliterate the uterine cavity at the point of flexion, conception is rendered very improbable, but still it may take place if no structural occlusion or atresia has occurred at the above mentioned point, for there may be space enough left to allow passage to the spermatic fluid, and unless the uterus be held by false membranes the flexion may be lessened in a horizontal position of the pelvis during coition by the weight of the fundus, and thus the occlusion of the cavity be diminished and the impregnating fluid be allowed to pass. Considering therefore, the frequency of sterility in females affected with ante flexion (Mayer found 60 ante flexions in 272 sterile females) other circumstances should be taken into consideration, especially derangements of menstruation, in the form of dysmenorrhœa and amenorrhœa, perhaps, also, the altered position of the vaginal portion (the os uteri looking backward) as well as a certain amount of cervical catarrh.

After an ante flexed uterus has been impregnated, it generally becomes straightened during the progress of pregnancy, unless it is fastened in its abnormal position by firm false

membranes. A gravid uterus may also become anteflexed during the first months without evil consequences to the further progress of pregnancy; at a later period it may become straightened, still a more considerable anterior inclination of the fundus may be apparent exteriorly, in the distention of the inferior abdominal region. Under unfavorable conditions the hyperæmia mentioned may cause hæmorrhage within the membranes and death of the fœtus. However, anteflexion of the gravid uterus rarely occurs.

B. RETROFLEXION OF THE UTERUS.

Literature: Besides those works already mentioned: Aëtius *Tetrabiblos*, sermo IV. Cap. 77 — Ambroise Paré, *Sur la génération*, 1640. — Reinick, 1732. — Saxtorph, *Collectanea etc. de ischuria ex utero reflexo*. 1775. — Henricus Cuyperus 1777. — Jahn *Diss. de utero reflexo*, in, Schlegel's *Sylloge* 1787. — Henschel, *Loder's Journ. f. Chir. Geburtsh. und gerichtl. Arzneik.* III. Bd. 3. Jena 1801. — Merriman, *A dissert. on retroversion of the womb*, etc. London 1812. — Schmitt, *Ueber die Zurückbeugung der Gebärmutter bei Nichtschwängern*. Wien. 1820. — Hensley, *Retrofl. of the ut.* *Journal pr.* 1848. 1—2. — T. S. Lee, *Retrofl. of the ut.* *London Gaz.* 1849. June — Leonidas van Praag *M. Zeitschr. f. Gebtsk.* Berlin. XXIX. 2. 1850. — Lehmann, *Zur Lehre von der Retrofl. ut., Nederlandsch. Weekblad von Geneeskundigen.* Nr. VIII. Febr. 1856. — C. Mayer, *Einige Worte über Sterilität*, *Virchow's Archiv.* Bd. X. pag. 115. 1856. — Scanzoni in work previously quoted. — Rokitansky and Virchow previously quoted. — John Moir, *On retroflex. of the unimpregnated Uterus etc.* *Edinb. med. Journal.* 1860.

RETROFLEXION is that anomaly of position and form of the uterus in which its upper portion, chiefly the body and fundus, is deflected posteriorly from the lower portion of the cervix, giving the organ a curve exactly the reverse of the normal one. The consequence is a horseshoe-shaped curvature of the uterus backward, and in the highest degree of this anomaly, a complete sinking of the fundus into the recto-vaginal space.

Whilst in anteflexion the smaller peritoneal sac, between the bladder and uterus, prevents any considerable sinking of

the deflected fundus uteri; Douglas' sac being larger, allows such a considerable sinking of the retroflexed fundus that the latter frequently falls below the level of the external orifice, and may be felt in the fornix, per vaginam.

Retroflexion of the uterus is also combined with a slight elevation of the organ, at least as regards the cervix. The latter, chiefly its lower portion, is pressed forward so as to lie more horizontally than is usual, consequently the os uteri is higher up and nearer the symphysis pubis, and sometimes can scarcely be reached with the finger per vaginam; the vagina is drawn upward and forward, its anterior wall especially, being stretched and considerably strained,

The vaginal portion is directed anteriorly and somewhat upward, and at the same time flattened in its antero-posterior diameter; the anterior lip especially appears shorter and narrower, and the traction exerted upon the anterior wall of the uterus and vagina, obliterates the invagination constituting the vaginal portion (Rokitansky).

On opening the abdominal cavity, and removing the intestines covering the pelvic organs, the vesico-uterine excavation appears shallower. Posteriorly from it, the cervix uteri forming its posterior wall, has ascended somewhat higher; that is, its anterior surface, being partly covered with peritoneum by its elevation, is situated more upward and forward. The highest point of the uterus, as viewed from above, appears as a rounded thick mass, the posterior periphery of which, at least to the left, lies in such close contact with the rectum, that Douglas' space has disappeared, that is, the entrance to it is closed by the fundus uteri; consequently the highest point of the uterus is its anterior deflected wall, the flexion occurring, almost without exception, at the level of the internal orifice.

On dividing a retroflexed uterus in an antero-posterior direction, the alterations of the uterine tissue are seen, chiefly at the point of flexion; the dense submucous layer of connec-

tive tissue in the posterior semicircle of the internal orifice is relaxed and softened; and, if such a uterus be straightened, there is sometimes a depression at the above point. In some cases, the tissue mentioned has assumed a callous firmness, and the retroflexion, to a certain extent, is rendered permanent by this condition. Such a uterus, even in the dead body, on being straightened, will resume its abnormal flexion.

It is well to again mention a case of retroflexion previously described. In the posterior portion of the fundus of the uterus of a woman, sixty-one years of age, a fibroid tumour, the size of a hen's egg, was found in the uterine substance under the peritoneum, bulging out at the median line, and causing the uterus to be retroflexed in its uppermost portion. At the inferior and anterior circumference of this tumour, its arterial and venous blood-vessels were situated, and, at this point the veins especially, were large and numerous, the greater portion of the uterine tissue being substituted by a venous flexus. At this point, half an inch above the internal orifice, the flexion was situated; the cervix and lower portion of the uterine body were lengthened by traction, the body and fundus markedly hypertrophied, and the cavity deflected at an angle. The peritoneum of the pelvic cavity and iliac fossæ was in a natural condition.

Although it cannot be denied that the considerable distension of the veins arising from the fibrous tumour was probably occasioned by hyperæmia, consequent upon the retroflexion, still, at an earlier period, the most yielding portion of the uterus must have been at the hilus of the tumour. In consequence of the development of the veins during the growth of the tumour, the uterine substance must have been absorbed, and the deflection have taken place at this point. According to the theory of Virchow, the weight of the tumour which depressed the posterior wall of the fundus, would seem sufficient to have caused a retroflexion at the level of the internal orifice; nevertheless, the continued firmness of the uterine

tissue at the usual point of flexion, prevented in this case, a retroflexion at that point.

In most cases, especially in young persons, the fundus and body of the retroflexed uterus is hypertrophied, and chiefly their posterior walls. The whole organ is thick-walled, and its tissue dense, but its cervix is often decidedly relaxed.

It is very important to again note, that the most frequent predisposing cause of retroflexion is *atrophy of the submucous tissue*, especially around the internal orifice, in its posterior semicircle. Although we may conceive that the latter alteration of tissue, strictly speaking, only predisposes to retroflexion, still, when other circumstances accede, as a displacing of the centre of gravity of body and fundus backward, retroflexion will the more readily take place if the first condition continues to exist. The above circumstances are occasioned by a considerable increase in thickness of the posterior wall of the uterus, which is often owing to successive parturitions. In the latter case retroflexion may take place so much the easier, as the round ligaments, the peritoneum, &c., are always more elastic after even a single pregnancy, and will but slightly oppose a gradual deflection posteriorly of the body of the uterus. A predisposing cause of retroflexion must therefore be looked for in pregnancy, as well as in the alterations of the uterine form and tissue occasioned by puerperal involution. For the round ligaments must be considered as important antagonists to the tendency of a virgin uterus to deflect posteriorly, and unless they have been considerably stretched by at least one pregnancy, and have become less resistant, notwithstanding puerperal involution, it is scarcely admissible that they would allow the fundus to sink suddenly backward and downward, excepting when a gradual and continued traction of these ligaments produces the same elongating effect as pregnancy.

I consider this circumstance as one of the causes why retroflexion is so comparatively rare in females who have never borne children, but I would still further remark that the con-

tractility of the round ligaments, is never entirely destroyed, not even by considerable stretching, and that after a certain degree of retroflexion has taken place, the round ligaments, the extremities of which have approximated, not only relax, but also by their contraction under certain circumstances, may contribute to increase the flexion, and even render it permanent; for the curtain-like peritoneal fold of the broad ligament is unable to oppose their contraction, and the highest degree of tension of the round ligaments certainly occurs in the slighter degrees of retroflexion, whilst it must necessarily be lessened in the higher degree of this anomaly.

As a further cause we must mention, that constant distension of the rectum forces the vaginal portion and the cervix forward and upward as far as the utero-sacral ligaments will allow, and facilitates a sinking of the fundus toward Douglas' sac. Fibroid tumours and tumours in general, which grow from the posterior wall of the fundus and body, will also cause the uterus to gravitate backward, and produce retroflexion. Finally, the pseudo-membranous products of perimetritis and pelvic peritonitis should be mentioned, which may be so situated as to cause a drawing of the fundus backward and downward. Of all these causes it must be remarked that, according to mechanical laws, they exert their influences the sooner, the nearer they are situated to the fundus, and consequently the longer the lever is, from the upper end of which they exert their power.

In the general relaxation of a marastic uterus, a pressure of the intestines is sufficient to cause retroflexion.

The fundus uteri in retroflexion has frequently deviated from the median line, and conjointly with the flexion, has undergone a distinct displacement to one or other side. In thirteen cases observed by Rigby, the fundus was situated to the left in nine of them, once to the right, and twice exactly in the median line. This proportion is the more surprising, as the rectum generally occupies the left pelvic

excavation, and the gravid uterus is more frequently situated obliquely to the right. These circumstances may be occasioned by inequality in the length of the round ligaments.

The consequences of retroflexion are various. In rare isolated instances it is developed into a complete angular flexion, as when in consequence of softening or atrophy of the posterior wall, a slight retroflexion has taken place, and then the fundus from its weight falls backward or downward. The resulting retroflexion, especially if the rigidity of the uterine tissue in the anterior circumference of the internal orifice remains unimpaired, may change into retroversion, and in this way those authors may be right who regard retroflexion as the first stage of retroversion; that is to say, retroversion may commence as a slight degree of retroflexion. After a time, the retroflexed fundus sinks between the rectum and vagina, and exerts pressure on both these organs, according as it is enlarged either by hypertrophy or dilatation. In consequence of pressure upon and stretching of the peritoneum, peritonitis readily ensues, and in many instances, as a result of this inflammation, false membranes are formed which may bind the uterus in its abnormal position. On the other hand, gangrene and perforation of the vaginal and rectal wall, may ensue in consequence of the pressure, and the retroflexed fundus may prolapse through the opening thus made into either of the above canals. A very interesting case of this kind has been mentioned by Rokitansky, in which a retroflexed fundus sank through a perforation in the posterior fornix into the vagina. At the same time the whole uterus was so displaced, that its vaginal portion looked upward and its fundus vertically downward; in this case the flexion existing at the commencement, was compensated by a total displacement much more considerable.

Rokitansky describes another case in which the fundus of a retroflexed uterus was found adherent in a perforation of the anterior wall of the rectum occasioned by sloughing.

Schott also describes another remarkable instance of prolapsus uteri, with retroflexion and perforation of the posterior wall of the vagina near the fornix.

It follows as a matter of course, that occlusion or diminution of the uterine canal at the point of flexion, may cause distention of the cavity of the body and fundus,—*hydrometra* and *hæmatometra*. But this seems to occur less frequently in retroflexion than in antelexion, and in general retroflexion is rarely developed into complete angular flexion.

By the pressure of the hypertrophied retroflexed uterus, the passage of urine through the ureters may be hindered, and dilatation of these organs and the renal calices, as well as dysuria may ensue.

When the gravid uterus is retroflexed, which of course can only happen during the first months of pregnancy, the life of the foetus is endangered by impairment of circulation, and the increasing enlargement of the uterus occasions an undue pressure upon the pelvis viscera and blood vessels of the lower extremities. Spontaneous straightening of the gravid retroflexed uterus does not occur, the promontory of the sacrum being a hindrance to such an occurrence. A retroflexed uterus may frequently conceive, still, Mayer records 36 cases of retroflexions in 272 of sterility.

Retroflexion of the uterus is congenital in very rare instances (T. Safford Lee), and sometimes it occurs before puberty. Most frequently, however, it takes place after repeated parturitions; when it occurs during pregnancy, it is rarely in primiparæ.

On the whole, retroflexion is of rarer occurrence than antelexion. Scanzoni in fifty-four cases of flexions, notes forty-six antelexions and only eight retroflexions. The higher degrees of retroflexion are however comparatively of much more frequent occurrence than the same degrees of antelexions, and yet in the latter complete flexion is very rare.

In some rare instances retroflexion is combined with a

second anterior deflection of the cervix, which causes the vaginal portion to lie more horizontally and the uterus to assume an S shaped curvature.

C. LATEROFLEXION OF THE UTERUS.

Literature: Besides the works already mentioned: Meckel Handb. v. path. anat. Leipzig, 1816. Bd. II. 1.—Seidemann, Von den Duvern, Drusen, und der schiefen Gestaltung und Lage der Gebärm. Heidelberg, 1840. Rigby, Times, August—November, 1845.

It is only very rarely that the body and fundus uteri are deflected from the cervix toward one or other side. This displacement is sometimes *congenital*, and very rarely *acquired*. The degree of flexion is of course very slight. The cause of congenital lateroflexion may be sought for, according to Virchow, in congenital shortening of one of the broad ligaments; that of acquired lateroflexion is mostly attributable to pseudo-membranous thickening of the broad ligament of either side, in consequence of which the lower part of the uterus is drawn toward one side, whilst its fundus is more or less stationary. In these cases also, the highest degree of flexion will be found at the region of the internal orifice, especially if the atrophy frequently mentioned, has occurred at this point.

According to all authors, lateroflexion seems to occur frequently in combination with anteflexion, and still more so with retroflexion, and it is easily understood that lateroflexion is liable to turn into ante or retroflexion. Rigby's cases of lateral deviation of the retroflexed uterus, belong to this category.

In congenital lateroflexion, the cervical canal is always straight and in the median line; in acquired lateroflexion the superior portion of the cervix deviates to the opposite side, the vaginal portion and os uteri being directed obliquely toward the side on which the angle of flexion opens.

Lateroflexion generally occasions no inconvenience, and only becomes dangerous from its liability to turn into ante or retro-

flexion. In its congenital form it is sometimes combined with obliquity of the uterus, in which case the angle of flexion is formed on the side of the higher half. (Rokitansky).

2. VERSIONS OF THE UTERUS.

Literature: V. Doeveren, *Spec. obs. acad.* cap. XI. pag. 163. — W. J. Schmitt, *Bemerkungen u. Erfahrungen über die Zurückbeug. der Gebärmutter bei Nichtschwangeren.* Wien, 1820. — Schreiner, *Inaugur. Abh. über die Vor- und Rückwärtsneigg. d. Gebärm. b. Nichtschwang.* Würzburg, 1826. — Mme. Boivin et Dugés *Traité prat. des malad. de l'utérus etc* Paris, 1833. Atlas Pl. [11. Fig 4 et 5. — Meissner, *Die Frauenzimmerkrankheiten.* Bd. II. Leipzig, 1842. — Lisfranc, *Clinique chirurg. de l'hôpit. de la Pitié.* Tom. Paris, 1843. — E. Lacroix, *De l'antéversion et de la rétrovers. de l'utérus.* Paris, 1844. — J. Bell, *Monthly Journ.* September, 1848. — Cruveilhier, *Traité d'anat. pathol. gén.* p. 731. Paris, 1849. — Kerlé, *Ueber die verschied. Arten von Schieflagen der Gebärmutter etc.* Hanover. *Corresp. Bl.* II. 6. 7. 1851. — Valleix, *Leç. clin. sur. les deviat. uter.* *Gaz. de hôp.* 1852 u. 1854. — Duncan, *On the displacements of the uterus.* Edinburg, 1854. — Scanzoni, *Krankh. d. weibl. Sexualorg.* Wien, 1857. — C. Braun, *Lehrb. d. Geburtsh.* Wien, 1857. — Détschy, *Wittelshöfer's med. Wochenschrift.* Wien, 1857. 29 u. 30. — Becquerel, *Les déviations de l'utérus.* *Gaz. des Hôpit.* 1857. Nr. 61. — Rokitansky, *Path. Anat.* III.

IN versions of the uterus the organ is deflected from the vagina in its entire length, and in such a manner that the anterior angle formed by the cervix and vagina, is either considerably diminished or effaced, or is changed into a posterior one.

As regards the general causes of versions, it may be remarked that pressure and traction, especially when acting in opposite directions, upon the fundus and cervix, occasion a rotation of the uterus around an axis located at about the region of the internal orifice; at the same time this latter point ascends somewhat higher in the axis of the pelvis than in the normal uterus. If version is to take place, it is essential that the uterine tissue be so far intact that its rigidity has not in the slightest degree been diminished. A relaxed and atrophied uterus seldom undergoes version, for the reason that a certain degree of rigidity and firmness of its tissue is necessary for ver-

sion. It may therefore be inferred, that in many cases a commencing flexion is changed into a version, simply from this cause that notwithstanding the pressure exerted upon the uterine substance at the point of the incipient flexion, atrophy of the tissue did not take place, and consequently a permanent deflection of the uterus in its longitudinal axis could not ensue.

As in flexions, so in versions we discriminate between the direction of the inclinations, and call them *anteversion*, *retroversion* and *lateroversion*.

Here we may remark that beginners will frequently confound the terms inclination and flexion, which is somewhat excusable, since by the term inclination flexion may be understood, and *vice versa*.

The confounding of these terms even by competent authors would render a change in terminology desirable. Thus Voigtel, Van Doeveren, Richter, Denman, Hunter, Levret and Meissner term that condition which we call retroversion, a *retroflexion*, Vogel calls it, *reflexion*, &c.

A. ANTEVERSION OF THE UTERUS.

Literature: Besides the works quoted: Lveret, Journ. de Med. Chir. et Pharmac. p. Roux Tom XL. Paris, 1773. — El. v. Siebold, dessen Journ. f. Gebirtsh. etc. Bd. IV. pag. 458. — J. B. Kyll, Beobacht. über Antroflexio uteri im nichtschwangeren Zustande. Seibold's Journ. Bd. XVII 1. — Ameline, Diss. sur l'antéversion etc. Paris, 1827. — Kiwisch, klin. Votr. Bd. 1. pag. 180. — Depaul, Traitem. des déviations utér. Paris, 1854.

In anteversion the uterus is so displaced that its longitudinal axis forms an angle with the axis of the pelvis, the upper portion of the organ deviating anteriorly, the lower posteriorly, and the centre of revolution being located at about the height of the somewhat elevated internal orifice. The uterus is consequently inclined forward at the region of the external orifice, its fundus leans toward the posterior wall of the bladder, the vaginal portion approaches the posterior wall of the pelvis,

and may in the highest degree of anteversion, reach the promontory of the sacrum. The anteverted organ at the same time always ascends in the pelvic cavity, which circumstance, combined with the upward displacement of the vaginal portion, stretches the vagina, and draws its superior portion backward and upward. In the higher degrees of anteversion the posterior vaginal wall becomes straighter and smoother.

As a matter of course anteversion of the uterus cannot attain a very high degree.

The predisposing causes of anteversion are supposed to be, pressure upon the cervix posteriorly and the fundus anteriorly; shortening of the round and utero-sacral ligaments; false membranes, especially in Douglas' sac, which render it shallower by traction; or pseudo-membranous adhesions to the fundus which by their retraction, draw it forward; thickening of the subperitoneal cellular tissue especially in Douglas' sac and toward the posterior pelvic wall, in consequence of *periproctitis* and *perimetritis*; increased weight of the fundus, particularly in its anterior wall, and especially when combined with inclination forward of the pelvis, which is itself considered a predisposing cause of anteversion, the posterior surface of the uterus in such cases being exposed to the pressure of the intestines in a nearly vertical direction and for a much longer time. Scanzoni also alludes to vaginal cystocele as a predisposing cause, the permanent distension of the bladder pushing the cervix uteri backward and thus causing anteversion. Peritoneal exudations impacted between convolutions of intestines and adhering to the uterus may also cause anteversion.

The effects of anteversion on the uterus itself are chiefly *hyperæmia* and *hypertrophy* occasioned by the traction of its investing membrane and its vessels; to the neighboring organs, pressure on the fundus of the bladder, impediment to the expansion of the latter, and pressure of the deviated vaginal portion upon the rectum. Siebold in a case of anteversion,

found the vaginal portion adherent to the rectum, and the os uteri could be felt through it.

Anteversion in most instances comes on slowly, but may take place suddenly. It seldom affects a gravid uterus, and if so, only during the first months; a sort of anteversion of the gravid uterus however is sometimes found with relaxed abdominal walls in diastasis of the recti-abdominal muscles. On pregnancy anteversions can have no influence, for, as the uterus gradually enlarges, it ascends spontaneously along the anterior pelvic and abdominal walls into its normal position, and in the natural condition, the pelvic and abdominal walls present no hindrance to its ascent. Impediment to its ascent might only occur from a conical outgrowth of the cartilage of the symphysis, protruding inwardly, especially from the superior portion; or from exostosis or other tumours arising from the pubic bones at their point of junction, which would have the same effect on anteversion as the promontory of the sacrum has on retroversions.

As I have previously mentioned, anteversion may be developed from incipient anteflexion, and the causes of it are to be sought for in a traction or pressure acting on the fundus anteriorly and cervix posteriorly, the tissue of the uterus at the same time being sufficiently rigid to resist a deflection in its longitudinal axis.

Anteversion in general is a rare form of displacement and occurs much less frequently than retroversion.

B. RETROVERSION OF THE UTERUS.

Literature: besides the general works quoted: Kulmus, *De uteri delapsu, suppressionis urinae et subsecutae mortis causa*. Gedani, 1732. — Saxtorph, *Coll. Havn.* Vol. II. pag. 127 u. 145. 1775. — Hunter, *Medic. observ. and inquir.* Vol. V. pag. 388. — Voigtel, *pathol. Anat. Halle*, 1805. Bd. III. p. 463. — Merriman, *Dissert. on retroversion of the womb*. London, 1810. — Ambr. Buczynsky, *Diss. de retrovers. uteri*. *Acta institut. Clin. Caes. Univ. Vilnensis*. Cap. XVII. Leipzig, 1812. — Bell, *Deweese, Philosoph. Journ.* London, 1821. Febr. Nr. 2. — P. Frank, *Opuscula posthum. etc.* Viennae, 1824. pag. 78. — Osiander, *Ursachen und Hülf sanz.* etc. Würzburg, 1833. — Mayer, *Presse méd.* Nr. 20. 1837. Froriep's *N. Notizen* I. pag. 311. — Froriep, *ebendasselbst*. Bd. VII. Nr. 19. 1838. — Simpson, *On retrovers. etc.* *Dublin quarterl. Journ.* 1848. May. — Kiwisch, *kl. Votr.* I. pag. 163. — Garin, *De la retrovers. de la matrice*. *Gaz. méd. de Lyon*. 1854. Août, September. — Bamberger, *Scanzoni's Beiträge z. Geburtsh.* etc. Bd. II. 1855. — Grenser, *Verhandlung. der Sect. f. Geburtsh. d. 32. Vers. deutsch. Naturf. u. Aerzte.* Wien, 1857. *Wittelshöfer's med. Wochenschr.* Wien, 1856. Nr. 38 u. 39.

In retroversion the fundus uteri gradually sinks into the hollow of the sacrum, whilst the vaginal portion ascends towards the symphysis; at the same time the uterus rises somewhat higher in the pelvis, although not to such an extent as in anteversion, and therefore the vagina is not so much stretched as in the preceding anomaly.

Formerly three distinct degrees of retroversion were commonly made. In the first, if the fundus was inclined toward the promontory of the sacrum it was sometimes called *posterior inclination* of the uterus; the second degree was assumed to exist when the fundus had descended below the promontory, and the cervix ascended upward anteriorly so as to touch the inferior margin of the symphysis pubis; the third and highest degree existed when the fundus was situated deeply in the hollow of the sacrum and the vaginal portion had risen above the symphysis pubis.

The causes of retroversion of the uterus are enlargements of the organ, especially of its body and fundus, combined with relaxation of the round ligaments; pregnancy up to the third and fourth months; excessive weight of the posterior

wall of the uterus, especially from tumours attached to it; excessive mobility of the uterus with pressure on the fundus backward and downward, and on the vaginal portion forward and upward, as from tumours impacted in Douglas' space inverting the posterior fornix, which is more likely to occur when they are so developed from the fundus or body as to exert simultaneous pressure upon the cervix forward, and traction on the fundus and body downward and backward; vaginal hysterocele (Froriep); and traction of false membranes in the direction mentioned. Finally, causes lying within the pelvis, as an excessive projection of the promontory, whereby the uterus when physiologically or pathologically enlarged, is hindered from ascending; exostosis acting in like manner; excessive inward curvature of the horizontal rami of the pubis; excessive curvature of the sacrum; an inclination of the pelvis less than normal; and especially too great width of the superior strait of the pelvis.

Over-distension of the bladder (Drejer, Osiander) cannot well be considered as a cause of retroversion; Saxtorph mentions amongst the causes, attachment of the placenta to the posterior wall of the uterus, but we can scarcely assume that this should increase the weight of the posterior wall; it would rather seem in Saxtorph's cases, that paralysis or unequal involution of the seat of the placenta, had produced that form of retroversion which Kiwisch describes as *partial* retroversion.

All the hitherto mentioned causes of retroversion cannot be regarded as other than predisposing ones; and in the majority of instances certain mechanical influences are added to one or other of them and thus immediately produce retroversion, as for instance the pressure of the intestines during violent contractions of the abdominal muscles, (Förster). Retroversion almost always occurs suddenly, and this proves that its final occurrence depends on mechanical causes, as all the above mentioned predisposing causes are pathological conditions, representing chronic ailments. The pre-

disposing and direct causes are supplemental to each other in this way, that according as the former have been more highly marked the latter may be the slighter and *vice versâ*. Neither one of the predisposing causes, or a mechanical influence acting alone, is likely to produce retroversion.

In the same manner as anteversion sometimes results from anteflexion, so in isolated cases retroflexion is said to resolve into retroversion, which statement, as regards the slighter degrees of retroflexion, is certainly correct. The highest degree of retroflexion, that in which the fundus uteri prolapses through the perforated rectum or vagina (Rokitansky), may lead to a peculiar form of complete version of the uterus.

The consequences of retroversion are more important than those of anteversion, for the reason that the former more frequently attains a higher degree. The fundus uteri in well marked cases, presses the more upon the rectum, according as it is increased in size and weight, and although the rectum can be displaced laterally at the entrance of the pelvis, yet this cannot take place at all or only with difficulty in the lower pelvic region, when it approaches the median line and the pelvic cavity becomes narrower. Here another circumstance must be considered, namely, that in most instances the rectum descending in the left pelvic space, is attracted toward the median line by the cervix uteri approaching the symphysis pubis, which consequently draws forward and stretches the insertion of the utero-sacral ligaments encompassing the rectum on both sides. By this mechanical action the rectum is drawn toward the dislocated fundus and cannot give way to it, because its peritoneal coat is similarly affected.

The vaginal portion of the retroverted uterus presses on the anterior portion of the bladder, compressing it between itself and the symphysis. In consequence of the pressure being exactly on the trigonum, the evacuation of the bladder is much more impeded than its filling. Bamberger mentions a

case of uræmia (observed in Oppolzer's clinique) which was caused by a retroverted uterus pressing upon the trigonum of the bladder, and which was followed by fatty degeneration and sloughing of the vesical walls.

Hunter describes a case of extraordinary distension of the bladder, in which the cervix of a retroverted uterus had drawn the trigonum up to the entrance of the pelvis. Lynne and Saxtorph even mention cases of rupture of the bladder in consequence of retroversion of the uterus.

The pressure exerted posteriorly by the fundus and body of a retroverted uterus, may be due to enlargement from a previous pregnancy, or to inflammatory or hypertrophic tumefaction, which latter may either have existed previously, and been the primary cause of the retroversion, or may have been produced in consequence of such a condition. The pressure upon the rectum will thus be increased, and defecation consequently impeded, followed by all the usual consequences, even that of stercoraceous fæcal vomiting. The pressure will also be extended to the various canals ascending and descending along the posterior walls of the pelvis, especially to the ureters, and the veins in that region. This latter pressure will cause stagnation of the blood and œdema in the lower extremities. The distension of the ureters above the point of pressure may extend upwards to the calices of the kidneys, causing distension of the same, and even atrophy of the organs (*hydronephrosis*).

We have already mentioned as being most remarkable, those cases, often quoted, of complete version of the uterus, in which the fundus has descended deeply into Douglas' space, whilst the vaginal portion, covered by the anterior wall of the vagina, looks upward toward the abdominal cavity, or rather, is imbedded into the anterior fornix so long as the latter exists, and the duplication, constituting the anterior lip of the vaginal portion, has not been effaced by excessive traction.

Retroversion occurs both in pregnant and non-pregnant females. In the former it is of more frequent occurrence

during the first months, for, as already stated, pregnancy is one of the predisposing causes of the affection. Excepting during pregnancy, retroversion rarely takes place in females who have never borne children. Kiwisch makes a distinction between *complete* retroversion, occurring only during the first months, and *partial* retroversion. According to this author, partial retroversion is induced by the depression of part of the posterior uterine wall into Douglas' space, in the shape of a sac, whilst the anterior and superior portion of the uterus occupy their usual position in the pelvic cavity. In this anomaly, the vaginal portion of the uterus is said to be directed anteriorly and upward. This deviation cannot be considerable, if as Kiwisch expressly states, the anterior and superior walls of the uterus are in normal position. From anatomical reasons I agree with C. Braun, that the term *partial retroversion* should not be applied to this condition; partial retroversion, in the true meaning of the term, being nothing more than retroflexion of the uterus. Prolapse of the posterior uterine wall (Dubois, Chailly, Hohl) is a more appropriate term, though even this, strictly speaking, is not quite correct.

A case is described by Grehser, in which a uterus, two months pregnant, had, together with the ovaries, penetrated the posterior wall of the vagina, and appeared at the vulva; the cervix still remained in the pelvic cavity. Mayer also mentions a similar case.

When a gravid uterus is retroverted, the fœtus is apt to perish from placental apoplexy, or miscarriage will sooner or later take place.

The most common, immediate and important consequence of retroversion is *perimetritis*, or *pelvic peritonitis*, which may become general and terminate fatally. It is natural to suppose, that in retroversion of the non-gravid uterus, menstruation will often be considerably deranged. When retroversion occurs after prolonged dysmenorrhœa (Bell) the latter must be considered as the first symptom of some other affection which

has produced the retroversion. In 272 sterile females examined by Mayer, 35 had anteversion of the uterus and only 3 retroversion.

C. LATEROVERSION OF THE UTERUS.

Literature: besides the general literature and the works mentioned on Obliquity of the Uterus: Baudelocque, L'art. des accouch. T. 1. Paris, 1781. — Böer, Abh. u. Vers. II. Th. Wien, 1792.

INCLINATION of the uterus to one or the other side never attains a high degree; the fundus is inclined either to the right or left, whilst the vaginal portion takes the opposite direction. This inclination is frequently combined with a slight twisting of the organ, its anterior surface looking toward the side to which the fundus is inclined. Latero-version is often combined with *obliquity* of the uterus. The acquired form is chiefly caused by traction or dislocation of the organ by tumours. It is not long since I saw a case of considerable right latero-version, occasioned by inflammatory callousness above and along the anterior portion of the left utero-sacral ligament; Douglas' space was of considerable depth, and the uterus had been rotated in the manner above mentioned.

A combination of latero- and anteversion, which might be termed *latero-anteversion*, is produced by the protrusion of an oviduct or ovary into the inguinal or crural sacs; also by pseudo-membranous shrinking of the round ligaments; or, after the occurrence of an abscess in the peritoneal folds of the latter, as in a case known to me in which an abscess perforated, and afterwards cicatrized, in the inferior inguinal region.

The highest degrees of this displacement are found in connection with large ovarian tumours, which during their growth encroach upon the peritoneum of the broad ligament in such a manner, as to lie in direct contact with the uterus.

The same occurs when large fibrous tumours grow from either lateral walls of the uterus, and in these cases the uterine cavity is usually deformed, and the organ is sometimes enormously increased in length, and curved in various directions.

3. ELEVATION OF THE UTERUS.

Literature: Colombat de l'Isère, *Traité des maladies des femmes*, etc. Tom. I. pag. 339. Paris, 1838. — Busch, *Das Geschlechtsleben des Weibes* etc. Bd. III. pag. 472. Berlin, 1839—1845. — Meissner, *Frauenzimmerkrankheiten*. Bd. III. pag. 648. — Kiwisch, *Klin. Vorträge*. Bd. I. pag. 210. Prag. 1845. — Scanzoni, *Krankh. d. weibl. Sexualorg.* pag. 126. Wien, 1856. — Rokitansky, *path. Anat.* III. Bd. Wien. 1861.

By elevation of the uterus is meant a displacement of the entire organ upward. The fundus ascends into the abdominal cavity, both peritoneal cavities thereby becoming shallower, and the fornix of the vagina being so stretched as to cause it to become *cone-shaped*. At the same time the vaginal portion disappears more or less, leaving merely a button-shaped rudiment, (Rokitansky). The vagina is also so stretched in its length, that its rugæ disappear, and its inner surface becomes smooth.

The causes of elevation of the uterus, lie either within, or are external to, the organ itself. The causes that originate in the organ itself, are an increase in volume of body and fundus, unless the latter has previously been bound down by adhesions in the pelvic cavity, in consequence of which ascent of the uterus would be hindered; distention of the uterine cavity by mucus or blood; formation of fibrous tumours, as round fibroid tumours, as well as fibroid polypi. To the class of external causes belong tumours of the broad ligaments or ovaries; adhesions formed during pregnancy, or the puerperal state, previous to complete involution (Rokitansky), and consequently any impediment to its physiological descent, which is also applicable to the few cases of successful Cæsarian operation. Finally, we may mention the vascular tumours of the vagina; tumours of the pelvis; and in general, such as force the uterus from below upward toward the abdominal cavity. As we have stated, slight degrees of elevation are found combined with flexions, and always with antelexions.

The effect of elevation of the uterus, especially when pro-

duced by other causes than tumours pressing from below, is elongation of the organ, chiefly of the cervix, to sometimes twice or three times its normal length, this elongation being generally accompanied with diminution of its cavity, and thinning of its walls; the latter condition however, is not proportionate to the elongation, and when it does occur, an increase of substance has taken place.

The diminution of the uterine cavity by longitudinal traction, is always more considerable near the internal orifice, even complete occlusion of the canal may take place. In isolated cases an obliteration of the canal at the above point occurs in consequence of rupture of so-called Nabothian glands, from the ruptured walls of which connective tissue is produced, and which ultimately leads to complete atresia of the canal by agglutination. The thinning of the walls of a stretched uterus, is also most considerable at the region of the internal orifice, and if the traction be considerable, rupture of the uterine substance may occur, causing the body and fundus to separate from the cervix, being simply held together by a peritoneal fold. It is easily understood, that in such cases, the cavity of the body must previously have been separated from that of the cervix.

4. PROLAPSE OF THE UTERUS; PROLAPSUS, DESCENSUS, PROCIDENTIA, HYSTEROPTOSIS.

Literature: Mauriceau, *Traité des malad. des femm. gross. etc.* Paris, 1668. — Fabric. Hildanus, *Observ. Cent. IV. obs. 80.* — Böhmer, *De prolapsu et inversione uteri.* Halae. 1745. — Morgagni, *de sedib. et caus. morb. Ep. XXXIV. art. 11. et Ep. XLV. art. 1—16.* — Chopart, *Diss. de uteri prolapsu.* Paris, 1772. — Saviard, *Observ. chirurg. Paris, 1784. pag. 44 u. 66.* — Stark, *dessen Arch. f. Geburtsh. 1798. I, Bd. pag. 73, 80 u. 87.* — J. F. Meckel, *dessen Journ. f. anatom. Varietaet. Halle, 1803.* — Voigtel, *Path. Anat. Bd. III, Halle. 1805. pag. 465.* — Clarke, *Observ. on diseases of fem. I. 1814. pag. 62. Taf. I—III.* — J. F. Meckel, *Path. Anat. Leipzig, 1816. Bd. II. Abth. 1. pag. 484.* — Cruveilhier, *Anat. pathol. gén. Livr. 26. pl. 4.* — Duparcque, *Traité théorique et*

prat. des maladies org. simpl. et cancéreuses de l'utérus. Paris, 1832. pag. 201. — D. Davis, The principles of obstet. med. in a series of systemat. dissertat. on midwif. etc. London, 1837. — Lisfranc, Bullet. de thérap. April 1843. — Mouremans, Ueber Gebärmuttervorfälle, Arch. de la med. belg. 1843. Nr. 1. — M. Retzius, Einige Worte über Gebärmuttervorfälle. Hygiea, 1845. October — Rigby, Med. Times. 1845. Aug. Novbr. — Froriep, Chirurg. Kupfertafeln T. 61. 65. 388. 389. 416. 417. — Kiwisch, klin. Votr. Prag. 1845. Bd. I. — C. Mayer, Beitr. z. Kenntniss und Behandlung des Prolaps. uteri. Verh. d. Ges. f. Geburtskde. etc. Berlin. Bd. pag. 123. — Virchow, Ueber Vorfall der Gebärmutter ohne Senkung ihres Grundes. Verh. d. Ges. f. Geburtsk. Berlin. II. p. 205. — Lione. de Corbelli, De l'origine des hern. et de quelq. affections de la matrice. Paris, 1847. — Seyfert, Prolapsus uteri geheilt durch Retroflexion. Prag Vierteljahrschr. 1853. Bd. I. pag. 156. — Förster, Spec. path. Anatom. Leipzig, 1854. pag. 298. — Chiari, Klinik. f. Geburtsk. u. Gynäcol. Erlangen, 1855. pag. 374 und Wiener Zeitschr. d. Ges. d. Ae. 1854. 6. Heft. — Retzius, Hygiea XVIII. pag. 56. 1855 u. 1856. — Scanzoni, Krankh. der weibl. Sexualorg. Wein, 1857. pag. 107. — Aug. Mayer, Ueber Gebärmutter und Scheidenvorfälle etc. Verh. der Ges. f. Geburtsk. in Berlin. Monatschrift etc. XII. 1. 1858. — Virchow, Verh. d. Ges. f. Geburtsk. Berlin. Bd. VII. u. VIII. — Franque, O. v. der Vorfall der Gebärmutter in anatom. u. klin. Beziehung. Würzburg. 1860. — Huguier, Mém. sur les allongem. hypertroph. du col de l'utérus dans les affect. désignées sous les noms de descente, précipitation etc. Paris, 1860. — Schuh, Vollständ. Gebärm. und Scheiden-Vorfall etc. Wiener Medic. Halle, 1860. 13. — Rokitansky, Path. Anat. III. Bd. Wein, 1861. Besides the above, the handbooks on gynecology, obstetrics and pathological anatomy.

By falling of the womb we generally understand a downward displacement of the organ, in the direction of its longitudinal axis, consequently corresponding with the axis of the pelvis.

The anatomical relations between the uterus and vagina will not allow the assumption of a sinking of the former, either without a corresponding shortening of the vagina by a kind of shrinking, which shortening, owing to the external attachment of the vagina, cannot easily take place; or without the latter being inverted by the sinking uterus. Hence, in most cases, *prolapsus uteri* is combined with *inversion of the vagina*, and according as this condition varies, three distinct degrees of prolapsus have been adopted for some time.

1. The uterus has simply descended somewhat into the vagina, the upper portion of the latter is inverted, or in other words, we might say, that the normal invagination of the genital canal, forming the vaginal portion, has been increased. In these cases the uterus is not visible at the vulva. This degree is termed *sinking of the uterus*, or *descensus uteri*.

2. The uterus has descended lower down, causing inversion of more than one-half of the vagina, and appears at the vulva. This degree is termed *incomplete prolapsus uteri*.

3. In this the highest degree, the uterus has descended as low as the vagina will allow, the whole or almost the whole length of which has been inverted, and protrudes from the pelvic cavity. The prolapsed uterus now lies outside the vulva, forming a large tumour between the upper portion of the thighs. This constitutes *complete prolapsus uteri* (*Procidentia uteri*, *hysterocele*).

According to the degree of prolapsus, various accessory conditions and consequences are developed. Even in the lowest degree the organ is always hypertrophied, and its longitudinal diameter especially, is increased.

In the first degree or so-called *descensus uteri*, in which the uppermost portion of the vagina is inverted, the vaginal portion appears much increased in length. Many authors positively deny the possibility of a simple *descensus uteri*, without accompanying inversion of the vagina, and indeed, such a condition is difficult to imagine; for then only could we speak of *descensus uteri* without inversion of the vagina, if the latter was found much relaxed and marked with transverse folds, the uterus at the same time being very low down, a condition which I have never heard of in any case. With tolerable certainty we may assert, that what was thought to be simple *descensus* without inversion of the vagina, was generally nothing but *hypertrophy* of the vaginal portion.

Owing to the widely different opinions in regard to the normal length of the vagina, (it is estimated by Velpeau to be

from 3 to 4 inches, by Cloquet from 6 to 8, and more correctly by Hyrtl at $2\frac{3}{4}$ inches*), it is often very difficult to distinguish hypertrophy of the vaginal portion from the first degree of prolapsus, (descensus uteri).

In well pronounced cases of complete prolapsus uteri, there is seen protruding from the vulva, a rounded more or less pear-shaped tumour, the size of the fist, of a whitish-red or bluish-red color, the thick coriaceous and epidermis-like covering of which, extends upward and all around, into the walls of the vestibulum. In the covering of this tumour we recognize the various coats of the completely everted vagina, which, especially in the higher degrees of prolapsus, and where the latter has existed a long time, scarcely exhibits a trace of the transverse folds which the vaginal mucous membrane possesses, according to age and previous pregnancies, in its normal condition. The disappearance of the rugæ is in consequence of the extreme distension of the vaginal walls. These rugæ or folds first disappear at the anterior surface of the tumour forming the prolapsus, which is undoubtedly owing to the shortness of the anterior vaginal wall, and which is therefore stretched before the posterior one is completely everted. The anterior surface of the prolapsus has a smooth and glossy appearance, whilst the posterior one is frequently still marked with transverse wrinkles. At the lowest extremity of the tumour, the external orifice of the uterus is situated. It is almost always directed somewhat posteriorly, a fact which from observations I am forced to admit with Scanzoni, notwithstanding the contrary might be inferred theoretically, from the greater shortness of the anterior wall of the vagina. Still it must be mentioned that even independently of the

* "In the erect position, when its own weight and that of the intestines, presses the uterus deeper into the pelvic cavity, the vagina shortens, and if the woman squats down and presses at the same time, it may become so short that the external os will be only an inch above the entrance of the vagina." Hyrtl, topogr. Anatomie. IV. Anfl. 1860. II. pag. 157.

inequality in the length of the vaginal walls, the eversion of the anterior one is always more considerable and complete.

The external orifice has usually a semilunar form, with its concavity directed posteriorly, or it appears as a transverse gaping slit, and no trace is left of the former vaginal portion, because the external layer of the duplication of the genital canal which formed the vaginal portion, passes directly upward in the same direction as the vagina. Sometimes the external orifice is so dilated that the cavity of the cervix, usually filled with viscid mucus, is to a certain extent open to view.

The surface of the tumour is coriaceous, compact and unyielding, and covered with a thick layer of epithelium, hence its whitish color; at its lower end, generally near the external orifice, spots varying in size, shape, (either round or confluent) and color, (from rose to a dark red) are seen, and which have the appearance of either superficial or deep erosions, or even ulcerations, which generally have sharply defined edges.

Kiwisch distinguishes from the usual form of prolapsus uteri, *senile prolapsus*, in which the external orifice is more frequently narrower than in the normal state, and we even meet with cases in which it is agglutinated or occluded by excessive epidermic growth.

Notwithstanding the considerable stretching of the vagina in prolapsus uteri, especially in its transverse diameter, its walls are always much thickened. This is chiefly owing to proliferation of its epithelium, which forming successive layers, may attain the thickness of a line, and appear in the dead body in the form of shreds. The mucous membrane underlying it is also thicker than usual, the submucous areolar tissue more resistant and more or less œdematous, and muscular coat of the vagina is always considerably increased in substance. Thus in every case of prolapsus uteri we find well marked signs of hypertrophy of all the membranes or layers of the everted vagina.

In consequence of the tumefaction of the uterus prolapsed into the everted vagina, and the stretching of the latter, the vagina is generally considerably distended, and we have already mentioned that lateral distention is the most considerable, therefore we may assume, that in some instances, this lateral distention of the vagina has occurred at the expense of its length.

If we open the abdominal cavity in cases of complete prolapsus uteri, we will always find, between the bladder and rectum, a funnel-shaped inversion of the peritoneum toward the floor of the pelvis. At either side of the upper and larger entrance of this excavation, the ovaries and oviducts are found drawn towards its margin, and frequently lying somewhat anteriorly, and in the depths of the inversion the fundus uteri will be discovered. The broad ligaments, especially in the beginning of prolapsus, are always in a state of considerable tension, and are sometimes stretched in the shape of folds, which ascend obliquely from the lower part of the inversion toward each side. The impeded reflux of venous blood occasioned thereby, is apparent in the uterus, ovaries and oviducts, as also in the everted vagina, presenting the appearance of passive hyperæmia, and even stagnation, owing to the bluish or bluish-red color from the intense varicose distention of the veins.

As mentioned, the uterus has become larger and longer, its walls, especially if the prolapsus is recent, are moister, soften and even somewhat relaxed. In the majority of cases, however, they are dense and resistant, in consequence of considerable hyperplasia; the mucous membrane is always in a state of hypersecretion and catarrh, and sometimes the cavity of body and fundus is distended by mucus, especially if the elongation of the organ be combined with a stricture of the internal orifice, however slight it may be. The relaxation of the uterine tissue is noticeable in the region of the external orifice, and consequently in what was previously the vaginal portion

and lower segment of the cervix, which part often assumes a spongy softness. This relaxation must be attributed to the varicose condition of the blood vessels, and absorption of the cervical tissue.

The intimate connection of the bladder and rectum with the vagina, will not allow us to suppose a complete inversion of the latter without traction of the connecting interstitial tissue, and consequently also, of the posterior wall of the bladder and anterior one of the rectum. In consequence of these conditions, parts of the neighboring organs are drawn down into the everted vagina. We will discuss this subject more minutely when we come to consider *EVERSION OF THE VAGINA*.

Not unfrequently a uterus, which was prolapsed during life, is found partly or entirely replaced after death. But in such cases the relaxation of the stretched uterine ligaments; the wrinkling and looseness of the peritoneum in the elongated Douglas' space; the enlargement and especially the elongation of the uterus; the peculiar form of its external orifice; and especially the width of the vagina and thickness of its walls, as also its peculiar appearance and coriaceous dry feeling, will give evidence that there was prolapsus during life. It is very easy to reproduce prolapsus after death by slight pressure upon the uterus.

Scanzoni remarks that the mobility of a prolapsed uterus after replacement, is so much increased by the relaxation of the stretched ligaments, that the organ is not only easily returned into the pelvis, but may even be pushed into the abdominal cavity considerably (1 to 2 inches) above its normal position; excepting of course those cases in which the displaced organ is bound down by pseudo-membranous adhesions.

A peculiar condition of the cervix is found in the higher degrees of prolapsus uteri. As mentioned above, the external orifice in many cases is so dilated that the cervical canal may

be viewed half way up. The latter is sometimes so rolled out as to increase the prolapsus on the one hand, and the eversion of the vagina on the other. In other instances, the puffed edges of the external orifice separate, the vaginal portion becomes more distinct, and the cervical canal is widely dilated in its lower portion like an infundibulum. In many cases the eversion of the cervix may reach such a degree that the internal orifice becomes the external one, the entire cervical canal being everted. The eversion, however, of the latter, is never so complete as that of the vagina; the inner surface of the cervix may become the inferior one of the tumour forming the prolapsus, but it is never rolled out so far as to form its external surface. The excoriations and ulcerations which usually denote the external orifice, and which never extend above it, affect also the mucous membrane of the cervix when the latter participates in the eversion. The mucous membrane of the canal when everted, appears as a bluish-gray ring encircling the entrance to the uterus.

The vulva, in the higher degrees of prolapsus, is considerably dilated, and in complete eversion of the vagina the vestibulum likewise, especially its anterior circumference being everted downward; this causes the orifice of the urethra to appear at the anterior surface of the prolapsus, and a catheter introduced into it, will enable us to recognize the complete alteration of its course. In such cases the urethra passes from forward and above, in a direction backward and below, as we will describe at the proper place. The distention of the vulva is always more considerable anteriorly than posteriorly, and is apparent even in those cases when the prolapsus has not yet appeared through it.

According to Kiwisch, the most important influence on the occurrence of prolapsus rests in the vagina, the latter in its normal condition being considered by him as the main support of the uterus; with which opinion however, after what I have said in regard to displacements of the uterus, I cannot entirely agree.

In a certain sense we cannot deny that the vagina, or rather the stretched fascia of the pelvis attached to the vagina, contributes to the support of the uterus; still other parts which contribute to normally uphold that organ, must be taken into account. To these, in my opinion, chiefly belong the joint action of the ligaments, especially the broad, the round, and the utero-sacral. The latter especially, forming a continuation of the pelvic fascia, are certainly capable of opposing with some resistance, a sinking of the cervix. In the above circumstances we also find a reason why prolapsus uteri occurs much more frequently in those who have borne children, and in whom consequently, all the ligaments are more elastic and more readily stretched. In such, the vagina is of course much more elastic and the floor of the pelvis more yielding.

Kiwisch makes three distinct divisions of prolapsus, according to its causes:—

1. Simple prolapsus, in which the uterus is displaced primarily by external violence or excessive abdominal pressure. If the violence is considerable even a virgin uterus may be prolapsed; if the cause be less violent this form only occurs in non-virginal females, the predisposing cause being the same; this latter is the variety most frequently met with.

2. Prolapsus occasioned by a prolapsed vagina drawing the uterus down with it; or by shortening of the vagina in consequence of a primary anomaly in formation; or in consequence of an ulceration with formation of a cicatrice; or as the result of senile atrophy.

Prolapsus of the vagina, when commencing in its upper portion, especially tends to cause prolapsus uteri. This form differs from the first in this, that the vagina descends before the uterus and the latter follows, at the same time the cervical portion of the uterus being necessarily much elongated. This form can never become very considerable.

3. That form of prolapsus caused by tumours, especially ovarian, situated in the vicinity of the uterus, and which press or draw it downward.

In regard to these statements, however, I must remark, as is mentioned by Kiwisch, that prolapsus from concussion of the uterus can only occur from certain predisposing causes, namely, a sufficient yielding of the pelvic floor, relaxation of the ligaments, and flaccid condition of the vagina; and I cannot recognize *congenital shortness* of the vagina as a predisposing cause of prolapsus.

It is true Kiwisch adds, that a shortening of the vagina is only the essential cause of prolapsus, if at the same time it is dilated and relaxation of the ligaments still exists. Including even these conditions, I doubt whether a short vagina predisposes to prolapsus, excepting in this way, that when it does exist the occurrence of complete prolapsus is rendered easier and more liable at an earlier period.

The formation of cicatrices after ulcerations in the vagina, can only occasion prolapsus of the uterus in the following way, that by a shrinking of the fornix vagina in its longitudinal axis, downward traction may be exerted on the uterus, which indeed may occasion some sinking of its vaginal portion, as well as elongation of its cervix, and in rare instances, a certain degree of sinking of its fundus, but the vagina will generally be decidedly in the way of the occurrence of a complete prolapsus, especially by its simultaneous contraction.

The causes of prolapsus uteri consequently lie either in the organ itself or in the vagina. In the first, from an increase in its weight, from tumefaction (Duparcque), fibrous tumours and polypi, unless the descent of the organ into the pelvic cavity is rendered difficult or impossible by the tumefaction; in the latter, as previously mentioned, from shortening of the vagina by contracting cicatrices. The congenital shortness of the vagina already advanced by Mad Boivin, I cannot accept as either a predisposing or direct cause of prolapsus. Another cause is senile atrophy, which is generally combined with shortening of the vagina from diminution of fatty tissue at its point of origin, and the conical shrinking of the fornix and relaxation of

the peritoneal attachments (Kiwisch). In stenosis of the external orifice with accompanying considerable distention of the cervical canal, which occurs not unfrequently in aged females, a corresponding distention of the upper portion of the vagina takes place, and if the distended cervix happen to collapse and discharge its contents, prolapsus may easily ensue. Prolapsus is also occasioned by primary inversion of the vagina combined at the outset with, or followed by, *cystocele* or *rectocele*; or by descent of tumours or intestines into Douglas' space, or the vesico-uterine excavation, which circumstances cause these peritoneal sacs to be deepened, and induce inversion of the vagina, and consequent descent of the uterus. Habitual accumulation of fæcal matter above the sphincter ani, causes a kind of vaginal rectocele which may likewise be considered among the causes of prolapsus. Scanzoni mentions as another cause, over-distension of the bladder, producing relaxation of the anterior wall of the vagina.

We may further mention as predisposing causes, in a certain sense, relaxation and tenuity of the ligaments, either acquired or congenital; roomy pelvis; insufficient inclination of the latter; and especially rupture of the perinæum, upon the influence of which in producing prolapsus Scanzoni has particularly laid great stress, and whose description I have chiefly followed. By perineal rupture the posterior wall of the vagina is deprived of its greatest support, its lower portion protrudes through the vulva, and dragging upon the uterus causes it to descend, in consequence of which the subperitoneal attachments of the bladder are loosened, and the peritoneum which has been stretched during previous labors, the more readily allows a considerable deepening of the vesico-uterine and Douglas' space, into which the intestines prolapse, and finally cause the uterus to descend into the readily inverted vagina. *Hydrops*, *ascites*, and *encysted exudation*, unless combined with pseudo-membranous adhesions confining the uterus in its position, also *retro-uterine*

haematocoele, will likewise cause deepening of Douglas' space, stretching of the ligaments, and finally prolapsus uteri.

Ashwell considered an insufficient action of the levator ani and perineal muscles, and chiefly of the pelvic fascia, as the principle cause of prolapsus.

Those forms of prolapsus which take place suddenly are chiefly caused by some abdominal pressure, concussion, straining, carrying heavy weights, lifting and stooping.

The ligaments being relaxed and the floor of the pelvis yielding, if a hypertrophied uterus descend on account of its weight, hyperaemia from traction of its vessels will ensue, and the hypertrophied condition of the organ will be increased, causing the incomplete prolapsus, or simple decensus, to be gradually transformed into complete prolapsus uteri.

The immediate consequences of prolapsus are, derangements of circulation and hypertrophy of the uterus; chiefly the cervical portion is elongated, often reaching an extraordinary length (3 or 4 inches). The so-called prolapsus of the uterus *without sinking* of the fundus, to which Virchow has again called attention, is highly interesting. He describes a case of complete inversion of the vagina with the external orifice of the uterus situated at its extreme end. In this instance the fundus uteri was not only at its normal elevation but rather above it. The enormous elongation of the uterus affected chiefly the cervix, the substance of which was dense and vascular. The entire length of the uterus from fundus to external orifice measured $6\frac{3}{4}$ inches, 3 inches of which belonged to the cervix (whilst according to Krause the greatest length of a normal uterus is $3\frac{1}{2}$ inches). Of the conclusions drawn therefrom by Virchow in regard to prolapsus I shall mention the two first; that there exists a prolapsus of the uterus without a sinking of its fundus, or as Morgagni states, with only a slight sinking, and that this condition is caused by hypertrophy and elongation of the cervix.

It is therefore advisable in such cases, especially when the

prolapsus is incomplete, to know whether we really have this condition before us, namely, a prolapsus without sinking of the fundus, in which case a replacement could not be entertained ; or whether we have a simple elongation of the vaginal portion of the uterus. In the latter the fornix is often found at its usual height, or only slightly drawn downward, whilst in prolapsus without sinking, as well as in incomplete prolapsus, the inversion of the vagina is always well marked. The expression "prolapsus without sinking" does not convey a correct idea of the condition described.

The elongation of the cervix in prolapsus, notwithstanding its hypertrophy, always takes place at the expense of its thickness. At the same time the uterine cavity is narrowed, and even complete atresia of the internal orifice may be found combined with distension of the cavity of the uterus from accumulated mucus.

In complete prolapsus the vaginal portion is generally softened and spongy, but in many cases it is thickened and denser. After the prolapsus has existed for some time, the excoriations previously mentioned make their appearance, at first being circular and well defined but after a time becoming deep ulcers, which secrete a corrosive ill-smelling fluid. This circumstance is owing to the contact of the atmosphere, the moisture from the urine, and friction of the thighs and clothing.

The vaginal epithelium increases, the external layers exposed to the air become dry and scaly, like epidermis, the epithelial cells lose their nuclei, and the other coats of the vagina become hypertrophied.

In aged females the external orifice of the prolapsed uterus is frequently found occluded by excessive epithelial growth, leaving only a shallow depression at the external part of the tumour, denoting where the external os is to be found.

I have lately been convinced of the frequency of this occlusion by mere epithelial growth in aged females.

Owing to the considerable contraction of those bloodvessels

whose office is to return the blood from the neighboring organs, the passive hyperæmia in the latter must be greatly increased, and catarrh and œdema of the oviducts and ovaries, and thickening of the former, will frequently ensue.

If prolapsus has occurred suddenly, the sudden traction of the peritoneum and resulting derangement of circulation, may cause the hyperæmia of the appendages to become inflammation. Consequently *perimetritis* sets in, and the false membranes formed during its course, are frequently the cause of the adhesion of the organs to each other or to the peritoneum in their abnormal position. Owing to this circumstance the prolapsus may become irreducible, especially as the thickening of the sub-peritoneal areolar tissue may contribute to the abnormal fixation of the uterus.

The inflammation of the pelvic peritoneum may also spread, and fatal general peritonitis supervene.

A frequent consequence of prolapsus uteri, is descent of the posterior wall of the bladder and the anterior of the rectum, caused by the inversion of the vagina. In consequence of the vaginal cystocele, the uterus undergoes considerable displacement and sometimes a moderate traction. In complete inversion of the vagina, which occurs in the highest degrees of prolapsus, the posterior wall of the bladder, around the trigonum, and even the whole organ, is considerably drawn upon, and its complete distension upward is partly hindered, by the descent of the vesico-uterine excavation causing considerable tension of the posterior peritoneal surface of the bladder. In consequence of these tractions, *stasis of blood* in the hypogastric and spermatic venous plexuses, *hyperæmia*, and finally *catarrh* of the *mucous membrane* is brought on. If by inversion of the vagina, as is generally the case, that portion of the bladder which corresponds to the orifices of the uterus, is subjected to traction, accumulation of urine, dilation of the ureters and *hydronephrosis* may ensue. (Retzius, Virchow).

As regards disarrangements of the sexual functions, gynecologists do not agree in their statements. Whilst Scanzoni maintains that prolapsus uteri is generally followed by derangement of menstruation, other experienced authors state that, strange to say, menstruation occurs with astonishing regularity in those affected. From these opposite opinions of distinguished pathologists, we may conclude that prolapsus uteri sometimes exerts an injurious influence on the function of menstruation, and at other times it does not, although we are unable to demonstrate with certainty the various anatomical conditions on which this difference is founded.

Repeated observations have however demonstrated that in prolapsus, conception can take place. When the body of the uterus has remained in the pelvic cavity, and enlarges during pregnancy, it spontaneously ascends in the abdomen, and the prolapsus is thereby rectified, the vagina being again drawn up and returned to its normal position. However, there is great danger in such cases of a sudden renewal of the prolapsus, and the occurrence of *complete inversion* of the uterus, after delivery.

Virchow mentions a case of Bartholins (Sepulchretum, Lib. III. Sect. 31. Appendix, ad. Observ. 5—Virchow), in which woman each time she conceived, was subject during the first months of pregnancy to a slight prolapsus uteri, though she never suffered from it during the intervals. Virchow here adds that Kiwisch denies the validity of the general opinion that the uterus sinks at the beginning of pregnancy.

If a uterus already pregnant is prolapsed, which as a rule occurs suddenly, and is only possible (under conditions otherwise normal) during the first three months, the sudden disarrangement of its circulation generally causes extravasation of blood within the membranes or placenta, and consequent death of the fœtus and miscarriage.

If a prolapsus has been replaced by manipulation, it may be permanently cured by nature by the occurrence of a *form-*

ative irritation in the peritoneum, and sometimes by the formation of false membranes consequent upon inflammatory processes, which afterwards hold the uterus in its normal position. Still this cure, from an anatomical point of view, must be considered as of a temporary character; for the false membranes will scarcely possess the firmness of the ligaments which normally maintain the uterus in position, and besides they gradually become stretched into cords which will readily yield. Seyfert mentions a case of prolapsus which was relieved by retroflexion; but it is difficult to say which of these was the lesser evil. A larger proportion of cures has resulted from impregnation of the uterus, the prolapsus, as previously mentioned, disappearing during pregnancy. If in such instances, after parturition, puerperal peritonitis with pseudo-membranous adhesions, comes on, the uterus during its gradual involution being held in its natural position, a recurrence of prolapsus may at least temporarily be prevented.

In the same manner a recurrence of complete prolapsus may be prevented, in consequence of *puerperal vaginitis*, by cicatrices contracting the vagina, although by their contraction in the longitudinal axis of the latter, a slight sinking of the uterus is necessarily occasioned. Both these occurrences have been observed by Scanzoni.

The statement of Scanzoni, that traction of the round ligaments facilitates the occurrence of inguinal hernia, cannot relate to the time during which the prolapsus exists; for then the ligaments are stretched out of the inguinal canal, and the latter can never be dilated by this traction. Besides, the tension of the peritoneum around the inner inguinal ring is too considerable during prolapsus to allow its being everted into a hernial sac; and in addition to this, the abdominal space allowed the intestines is increased by the deepening of the pelvic cavity. But if the prolapsus be replaced, the peritoneum covering the round ligaments must be considerably relaxed, and consequently the occurrence of inguinal hernia rendered much more easy.

Prolapsus uteri, as may be inferred from what has been said, takes place either in an acute or chronic manner. It occurs in an acute manner when, in addition to the predisposing causes mentioned, a pressure is exerted upon the uterus, as for instance, from excessive abdominal pressure. In this case the chief predisposing causes are, a relaxation of the uterine ligaments from frequent pregnancies, and a greater yielding of the pelvic floor, resulting from the same cause. Of 114 cases of prolapsus uteri observed by Scanzoni, 99 were in woman who had borne children. Still, senile relaxation of the parts mentioned must be taken into account as an important predisposing cause.

Prolapsus arising in a chronic manner, is chiefly induced by partial inversion of the vagina, especially when this inversion commences with cystocele and rectocele, and the former gradually reaching its highest degree, drags the uterus with it; it is also frequently occasioned by a deepening of Douglas' sac from intrusion of intestines (*vaginal entrocele*).

According to Scanzoni's statements prolapsus uteri rarely occurs in those who have not borne children. It is less frequent in those who have borne one, than in those who have had several children, the predisposition thus increasing with successive deliveries. As age advances, its occurrence is rendered easier in consequence of senile relaxation. We therefore meet with prolapsus uteri most frequently, and in its most perfect forms, in aged women who have frequently been delivered. It has never been known to occur before perfect maturity.

In its highest degrees, prolapsus may cause death by the previously mentioned effects upon the functions of the urinary passages and the rectum, as also in its acute form, by the occurrence of general peritonitis.

5. INVERSION OF THE UTERUS.

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By inversion of the uterus we understand a folding inward of the organ into its own cavity, or into that of the vagina.

We may therefore, anatomically speaking, distinguish two degrees of inversion; either the fundus is inverted more or less into its cavity, the inverted portion being within the cavity of the uterus; or, the uterus has been so completely inverted that its mucous surface has become the external one, and its peritoneal surface the internal; the vaginal portion turning upward forms the highest portion of the uterus.

Busch distinguishes as the primary degree of inversion, *simple depression* of the fundus uteri. In this case the fundus or a

portion of the body is inverted, but has not passed beyond the internal orifice, whilst in the second degree, the so-called *incomplete* inversion, the inverted portion protrudes through the os uteri. Both of these degrees may be termed *incomplete inversion* of the uterus, in order that they may be distinguished from *complete inversion*, which is the highest degree of this affection.

In a case of incomplete inversion of the uterus, on opening the abdomen, and removing the intestines from the pelvis, we find in the space between the rectum and bladder, a cylindrical or conical body, broader in its upper portion, on the superior surface of which a small funnel-shaped recess is seen, and towards which, according to the degree of inversion, the insertion of the oviducts into the uterus, are more or less drawn laterally.

In incomplete inversion, we find between the bladder and rectum a large space, and in its depths toward the outlet of the pelvis, again a funnel-shaped fossa, surrounded by the walls of the inverted uterus and lined with the peritoneal covering of the latter. The fundus uteri forming the lowest portion of this cavity, the ligaments of the uterus and the oviducts likewise, are at least partly drawn into this space. As regards the size of this cavity, and the relations of the uterine appendages to it, Betschler has lately corrected the opinions formerly held on this subject. The size of the cavity depends upon that of the uterus before inversion. It must be large when the inversion has occurred in an acute manner after labor, and much smaller if it has occurred in a chronic manner; as for instance, in consequence of a pathological growth. During the enlargement of the pregnant uterus, the oviducts and ovaries are drawn into the lateral margin of the former in such a manner, that the ovaries are almost in contact with the uterus; which circumstance is certainly caused by the uterus taking up the peritoneum of the broad ligament during its distention. If the uterus be inverted, it is evident that the oviducts and ovaries will be found in the newly-formed excavation. But if the inversion has occurred in consequence of

a tumour, neither the ovaries or the fimbriated extremities of the oviducts, have been so approximated to the uterus as to be drawn into the inverted cavity; on the contrary, we find that in such cases only the commencement of the oviducts are within the excavation.

After an inversion of the uterus, succeeding labor, has existed for a certain length of time, the process of involution of the organ is not arrested, and as this progresses, the above-mentioned excavation diminishes, and the oviducts and ovaries which in the commencement were in it, resume their original position laterally from its margin.

Betschler calls attention to a peculiar relation of the intestines to an inversion of the uterus. It is generally stated that intestines may prolapse into the cavity formed by the inversion; yet in the reported cases of amputation of inverted uteri, it is never mentioned that intestines were found. If the inversion is incomplete, and the uterus has not been inverted deep enough, a portion of intestine may indeed happen to fall into the cavity, and may prolapse still lower down as the inversion increases. If then the fundus uteri passes through the internal orifice, the inverted part may be constricted, and the intestine incarcerated. But afterwards when the fundus descends still lower down, the cavity of the inversion is diminished by contractions, which taking place from below upward, and aided by the peristaltic action of the prolapsed intestines, expel the latter. It is true that this may be prevented by adhesions between the intestines and uterus.

From the anterior margin of the above cavity two tightly stretched cords, the round ligaments, are seen to ascend in a curve towards the inner inguinal ring. The peritoneum around the entrance to the cavity is stretched into folds, especially on both sides; sometimes posteriorly two sharply defined peritoneal folds project, which are formed by the utero-sacral ligaments.

In complete inversion of the uterus the organ protrudes into the distended vagina in the shape of a pyriform mass, or as a

large and relaxed, or small and dense rounded tumour, chiefly of a dark or bluish-red color, and covered with mucous membrane, the superior limits of which may be easily felt. The lips of the inverted vaginal portion form a sort of circular rim, the lower border looking toward the fornix. The mucous membrane of the uterus is now in direct contact with that of the vagina, and it happens very frequently that, after or contemporaneously with inversion, the vagina is also inverted, and sometimes so completely, that the inverted uterus descends below the vulva. This combination has very properly been termed *prolapsus of the inverted uterus*, and constitutes a complete inversion of the entire genital canal.

Incomplete, as well as complete inversion of the uterus, can only occur when the organ is in a relaxed state; and it is only in very rare instances that a nearly normal uterus can gradually be inverted.

Inversion consequently occurs almost exclusively after delivery, at which period the uterine walls are very much relaxed, and the cavity of the uterus comparatively large; and it is especially likely to occur if the contractions take place unequally, the fundus contracting whilst the cervix is entirely relaxed. Inversion is also met with independent of the puerperal condition, as when large polypi with broad pedicles are attached at or near the fundus uteri, and having distended the organ are expelled, drawing the fundus with them. To consider hydrometra and hæmatometra as causes of inversion, as Busch does, is only allowable in rare instances, and in slight degrees of inversion, for the reason that in the higher degrees of inversion, the body and fundus uteri lose their contractile power, whilst the cervix is generally well contracted and frequently hypertrophied. Besides, these distentions of the uterus seldom attain a higher degree, and we may therefore presume that only after sudden evacuation of accumulated mucus or blood, inversion of the fundus uteri might possibly occur.

If inversion of the uterus takes place immediately after delivery, it is either in consequence of precipitate labor, or

shortness and twisting of the umbilical cord, and probably also of incautious traction on it when the placenta is firmly adherent.

In women who have died from puerperal endometritis, the uterus often bears deep impressions of the neighboring organs, and its external form is often flattened from the pressure of the intestinal convolutions. In many instances these impressions become deep fossæ, and may lead to complete inversions (Kiwisch).

Merriman observed in most of the inversions of the uterus which occurred after parturition, a firmer attachment of the placenta to its walls, combined with greater thinness and laxity of the organ, and he looked upon these conditions as the cause of inversion.

Rokitansky particularly mentions the fact of the unequal contraction of the uterus, and especially, that that part to which the placenta is attached, is most frequently imperfectly contracted; which condition combined with abdominal pressure, causes inversion.

A very remarkable class of cases are those in which, without apparent cause, an inversion of the cervix into the vagina takes place, drawing the fornix of the latter with it, and thus forming a polypus-like tumour in the cavity of the vagina, which may reach down to the vulva, and at the lower extremity of which the internal orifice is situated, (Lawrence). In these cases it is probable that partial inversion of the lower portion of the cervical canal took place, being afterwards complicated with prolapsus uteri. Virchow mentions these partial inversions of the cervix as having been first described by Tyler Smith. They are said to be caused by the development of larger follicles in the vaginal portion, in consequence which the external orifice is dilated, and the relaxed lips of the os uteri are gradually everted. When this inversion has once occurred, every succeeding pregnancy contributes to increase it.

When prolapsus exists, and the external orifice is large and wide, it is known that the uterus with its large and wide vagi-

nal portion may increase the inversion of the vagina and the prolapsing tumour, for the reason that the cervix is more and more everted and rolled up, (Aug Mayer).

All these classes belong to one category, and consequently partial inversion of the cervix may be the result of leucorrhœa and an increase of the uterine follicles, especially when combined with descensus uteri. But such an inversion of the vagina may also be caused by prolapsus, if the vagina is firmly attached and unyielding in its superior portion, and offers resistance to the descensus, especially when the cervix and vaginal portion are relaxed by catarrh, by cystoid degeneration of the mucous follicles, and more or less previous dilatation of its cavity.

Dr. Ulrich of Vienna observed a case, known to me from the post mortem examination communicated by him, of inversion of the posterior wall of the uterus caused by a fibrous polypsus, which was attached in the vicinity of the internal orifice, and first descended with the inverted uterus into the vagina, and afterwards with the completely inverted vagina, through the vulva, a case having no analogy that I know of, and one peculiarly interesting from the singular flexion of the fundus.

Both forms of inversion of the uterus occur either in an acute or chronic manner; and accordingly their consequences, especially those of complete inversion, are different.

Complete inversions occurring suddenly, are, according to the statements of all pathological anatomists and gynecologists, frequently fatal, in consequence of the shock which the nervous system receives, and I am unable to refute this statement. Still, its correctness can only be assumed from want of other arguments. In the majority of cases, when inversion takes place suddenly after delivery, hæmorrhage supervenes from the open veins of the part to which the placenta was attached, and which is the more obstinate on account of the uterus being at least momentarily paralyzed and its vessels over-distended, from traction. This hæmorrhage will sometimes con-

tinue after replacement, because the veins at the seat of the placenta remain open, owing to deficient contractile power of the uterus, excepting the cases in which thrombosis occurs, which may extend upward so much the easier as the veins are enlarged, and then the consequences of extended thrombosis may in various ways prove fatal.

In consequence of the excessive traction which the uterus and its appendages suffer, inflammation of the organ, peritonitis, and especially perimetritis, may supervene. Cases have also been observed of absolute stasis and gangrene caused by the contraction of the cervix of the inverted uterus, and in consequence of which the entire organ may slough away (Martin, Davvill), and yet the case result favorably. We must mention in regard to this contraction of the neck of the uterus, that if intestines lie in the cavity formed by the inversion, they may be incarcerated, and consequently in very rare instances such a termination may be observed.

In complete chronic inversion of the uterus, hæmorrhages also occur, mostly from the uterine mucous membrane which is exposed to external influences, but in general, chronic inversion gives but little trouble. Those cases are also interesting in which the uterus, inverted in an acute or chronic manner, is so diminished in size by contraction and involution, that it forms an inconsiderable tumour causing no inconvenience to the patient.

In inversions, epithelial vegetations, excoriations and even ulcerations are frequent on the surface of the mucous membrane. The epithelium of the inverted and, prolapsed uterus is transformed, especially in the cases of vegetations just mentioned, into a pavement epithelium similar to that of the vagina.

During the presence of the inverted uterus within the vagina, ulcerations on their respective surfaces may granulate, and adhesion of the mucus surface of the uterus to that of the vagina may result.

Kiwisch observed a case of carcinoma of an inverted fundus uteri.

6. HYSTEROCELE OR METROCELE.

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WHEN the uterus is so displaced that it is situated in a hernial sac lined by the peritoneum, it constitutes what is called hysterocele.

According to the situation of the hernia, the following varieties of hysterocele occur.

1. *Inguinal hysterocele.* In this form the entire uterus or its fundus has entered an internal or external inguinal sac. Cases of this kind are very rare, especially of the gravid uterus, and the possibility of the latter is the more doubtful, since extra-uterine pregnancy has been found in an inguinal hernial sac (Skrivan), and has been mistaken for it (Lumpe). A gravid uterus can only be displaced into a large inguinal hernia existing previously, which is of rare occurrence in females. From the above we take peculiar interest in the case of Rektorzik, in which it was supposed that the rudi-

mentary accessory horn of a uterus unicornis, was situated in a right inguinal hernia, and being impregnated in this position, pregnancy reached its normal limits and a matured child was delivered by the aid of the knife. An examination of the mother who died soon after, was, I regret to say, not allowed.

Inguinal hysterocele is sometimes congenital (Maret), and is of more frequent occurrence in children than adults, undoubtedly owing to the situation of the oviducts and ovaries, above the entrance of the pelvis, being more favorable to the occurrence of such a hernia.

2. *Crural hysterocele*. In this variety the uterus prolapses with its fundus foremost, into a crural hernial sac. This may occur to the gravid (Sennert, Döring, Saxtorph) as well as to the non-gravid uterus, (Lallemand).

3. *Dorsal*, or more properly, *ischiatric hysterocele*. In this the uterus passes into the hernial sac which prominates through the greater ischiatic notch. This hernia was observed in an incomplete stage by Papin (Epistola ad Hallerum de stupenda hernia dorsali). The hernial sac may enlarge considerably and extend further under the integuments.

4. *Hysterocele through the foramen obturatorium* or *ovale* (Kiwisch). The uterus in this form is found protruding through the foramen ovale of the hip bone.

5. *Umbilical hysterocele*. Observed only when the gravid uterus has passed into an umbilical hernial sac (Leotraud, Murray).

To these true herniæ we may add the so-called

6. *Ventral hysterocele*—the most frequent variety of displacement of the uterus. It occurs in consequence of rupture of the aponeurosis, or more commonly, after the separation of the recti muscles of the abdomen, which up to the present time has only been observed in pregnant women. Kiwisch states that in rare instances this displacement of the uterus may occur laterally from the recti muscles. Ruysch describes a case in which the gravid uterus was forced through a ruptured

cicatrice, resulting from an abscess in the inguinal ring. Roussett and Ashwell saw a case of ventral hysterocele, which resulted from rupture of the cicatrice after a successful Cæsarian operation. In many cases ventral hysterocele does not constitute a true hernia, the peritoneum and aponeurosis being pressed forward into the space formed by the separation of the recti muscles.

Kiwisch speaks of this displacement as *eventration* of the uterus with inclination forward, a term more correct than the former. In cases of ventral hysterocele the abdominal walls are very thin.

Hysterocele in the majority of cases, should generally be considered as a secondary displacement of the uterus. Primarily the ovaries and oviducts enter the hernial sacs, and appear to be adherent to them; or rather that portion of the peritoneum forms the hernial sac, which is nearest to the superior extremities of the broad ligaments, whereby the ovaries and oviducts are carried into the sac. Thereupon the sac increases in size at the expense of the peritoneum constituting the broad ligament, by which latter the uterus is gradually drawn to the hernial ring, and finally enters the sac. In many cases the uterus follows a prolapse of omentum or intestine into a hernial sac, especially if there are adhesions between the omentum or intestines, and the uterus.

We must mention in regard to *congenital* inguinal hysterocele, that it is caused by an incomplete descent of the ovaries, analogous to a similar process in the male, the uterus being drawn with them.

The gravid, as well as the non-gravid uterus, may pass into a hernial sac, and the gravid one may even be impregnated in this position. Some forms of hysterocele, however, are peculiar to the gravid uterus only, as umbilical and ventral hysterocele, In such cases labor pains commonly come on before the full term of pregnancy, still cases are known even of inguinal and crural hernia of the gravid uterus, in which the foetus

matured and was delivered by an operation similar to the Cæsarian.

In general, hysterocele is of very rare occurrence, and only of importance from the co-existing dysmenorrhœa and its effects.

II. ALTERATION OF THE FORM OF THE UTERUS.

The anomalies of form of the uterus depend chiefly on the condition of its cavity. Its form is also subject to various irregularities in consequence of the developement of various new-formations in different portions of its tissues, and further, by mechanical causes acting by traction or pressure, but which are so manifold, and may appear so peculiar in each individual case, that they cannot be brought under one classification. Various alterations in the form of the uterus are also described by gynecologists, under the name of *hour-glass uterus*, which is said to be caused by an annular contraction of the organ, when the rest of its tissue is relaxed, but which is very rarely seen in the dead body, or only in such an imperfect degree that it is almost impossible for anatomists to consider such as particular cases. We therefore content ourselves with mentioning abnormal proportions of the uterine cavity, as being the most important conditions, which alter the form of the uterus.

ACQUIRED STRICTURE AND OCCLUSION OF THE CAVITY OF THE UTERUS, STENOSIS AND ATRESIA UTERI ACQUISITA.

Litaturae: Hippocrates, De. morb. mulier. Lib. II, cap. 50 — Fabricius Hildanus. Opera observ. etc. Francof. 1646 — Littre, Mémoires, de l'acad. des sciences. Paris. 1704, pag. 33; 1707. pag. 27 und 1720 pag. 16 — Morgagni, De sedib. et. caus. morb. Venetiis, 1761. Ep. XL. art. 14—21., Ep. XLVII. art. 9., 11. — Trezel in E. Sandifort Thesaurus disserat ionum. Vol. II. Nr. 3. — Weisse, Historia partus impediti ex membr. tendin. os uteri intern. arcante. 1761. in Sandifort's Thesaur. diss. Vol. II. pag. 75. — Hebenstreit. De uteri concretionem morb. Lipsiae, 1801. Siebold, Handb. der, Frauenzimmerkrankh. Frankfurt, 1821. II. Aufl. Bd. I. pag. 218. — Kittel, Die Fehler des Muttermundes etc. Würzburg, 1823. — W. Schmitt, Heidelb. klin. Annal. 1825. Bd. I. 4 — Kilian, De perf. uteri gravid. atresia; Diss. Bonn. 1831. — Tweedie, Zeitschr. f. d. ges. Medicin. 1838. Bd. VIII. Heft 4. — H. F. J. Naegele, Mogostocia e conglutinatione in externo uteri etc. Heidelberg, 1835, dann Med. Annal. Heidelberg, 1836. 2. Bd., und Nachtrag in ders. Zeitschr. 1840. 6. Bd. — Meissner, Frauenzimmerkrankheiten. Leipzig, 1842. — F. Servaes, De conglutinatione in externo uteri orif. posit. Halae, 1853. — Kiwisch, Klin. Votr. Prag. 1854. Bd. 1 pag. 152. — Schweitzer, Narbige Verwachsung des Muttermundes. Monatschr. f. Geburtsk. 1855. Berlin. Febr. — Heue N. Zeitschr. f. Geburtsk. Berlin. Bd. II pag. 425. Scanzoi, Beir. zur Geburtsk. etc. Würzburg, 1854. Bd. I. pag. 176, und Krankh. d. w. Sexual. Wein, 1857. pag. 53., — Birnbaum, Deutsche Klinik 1857. Nr. 1. — C. Braun. Lehrb. d. Geburtsh. Wien, 1857. pag. 295. — E. v. Siebold, Zur Verklebung des Muttermundes als Geburtshinderniss. Monatschrift für Geburtskunde. Berlin, 1859. XVII Bd. 2.

PARTIAL contractions and occlusions of the uterine cavity take place chiefly at its orifices, and as regards frequency, those at the internal orifice are more frequently observed than those of the external; whilst throughout the remainder of the uterine cavity, stricture or occlusion is rarely found. Sometimes the entire uterine canal is diminished by concentric hypertrophy or atrophy, but by the term *stenosis*, a partial contraction is always understood.

Strictures of the uterine cavity are often caused by annular contraction at a certain point, especially at the internal orifice. From an anatomical point of view, however, we must above

all mention the purely mechanical causes of stenosis at the internal orifice. First, to this class belong contractions from external pressure, including the cases in which fibroid tumours in the wall of the internal orifice cause contraction; and further, those contractions arising from partial and complete flexions, as well as tractions of the uterus in its long axis. In these cases the diminution of the cavity is apparently a narrowing of it, being most marked at the internal orifice and accompanied with thinning of the uterine walls. A purely mechanical stricture rarely affects the external orifice, and perhaps those cases might be here included, in which after displacement, (especially ante-flexion) a flattening of the vaginal portion of the uterus with a slight contraction of its canal, occurs in consequence of pressure. When tumours, developed in the vaginal portion and affecting either lip, exist, stricture is never observed. Contractions arising from a diseased condition of tissue are more important and equally valid for both orifices. To this class belong in both orifices, thickening of the mucous membrane from catarrh, enlargement of the follicles, with increased prominence and degeneration into cysts. Further, tumours which lessen the canal, as for instance such as originate from the body and fundus, and come in contact with the internal orifice, or when developed from the cervix, grow outward to the external orifice. It must here be mentioned that if these tumours possess a certain density, they will first cause a dilatation of the corresponding orifice, which is, however, again occluded by the pseudo-plasma, and we must also mention that after the largest periphery of these new-formations, which without exception are pedunculated, has passed the orifices, a contraction of the latter ensues, causing the pedicle, however thin, to be again tightly constricted.

Finally, those strictures must be mentioned which are caused by the growth of granulating tissue, resulting in a constricting cicatrice. At the internal orifice they frequently arise from rupture of the so-called Nabothian glands; at the external

orifice, in consequence of cicatrization after ruptures, contusions, and the various ulcerations occurring in that region.

Strictures from the inward growth of tumours, as met with in other cavities, cannot occur in the uterine cavity, from the fact that its walls, in the normal state, are nearly in contact with each other. Any tumour growing into the uterine cavity only tends to increase the surface of its walls, even when they lie in close contact.

Occlusion of the uterine cavity, *acquired atresia* proper, is generally the final result of a stricture and arises from similar causes. We may distinguish somewhat between *obstruction* and *occlusion*. Thus, occlusion of the uterine cavity and especially of the cervical canal, is frequently caused by viscid, tenaceous mucus, which even in the dead body, can only be removed from its walls with difficulty. Obstructions, especially of the orifices, by prolapsed tumours may also be included here in so far as these tumours only leave a small portion of the cavity open. The importance of occlusions caused by these various tumours is much increased when an accumulation of fluids above the point of obstruction causes them to press upon the orifices; which accumulated fluid on the other hand causes a corresponding dilatation of the latter, sufficient to allow the passage of the broadest portion of the obstructing mass if it be pedunculated.

Genuine atresia, different from agglutination and obturation, results from uniting growth of tissue, either from the borders of the orifices, or the walls of the body of the uterus. When in consequence of considerable traction of its long diameter, or of flexion, the walls of the uterus are brought in contact under a certain amount of pressure, the texture of the thin mucous membrane becomes altered, or it is absorbed, and atresia occurs at this point. It is also often caused by the rupture of previously existing Nabothian glands, from the borders of which granulations arise and give rise to atresia. This occurs much more easily when superficial erosions, arising

from catarrh or desquamation of epithelium, exist. Granulations from ulcerated surfaces likewise frequently lead to atresia.

Rokitansky also mentions atresia of the uterus as the final result of concentric atrophy.

Degeneration of the uterine mucous membrane and polypoid hypertrophy of the same, frequently occasion atresia of the cavity of uterus. In the uteri of aged females especially, we often find bridge—or ridge-like adhesions of the uterine walls in contact, chiefly in the neighborhood of the oviducts; further, adhesions of the posterior and anterior walls of the uterus are caused by vegetations of the mucous membrane, or other tumours developed from the lateral point of apposition of the walls mentioned.

Those atresiae which extend over a large surface, generally involve the cervical canal. The tissue which causes the occlusion in such cases, is a loose, sometimes vascular connective tissue, which extends from one wall to the other in the form of filaments or bands, frequently enclosing between them spaces filled with serum, of which it is difficult to say, whether they are remains of former follicles, or, which is more probable, whether they are evidences of incomplete occlusion of the cervical canal. In the majority of cases the adhesions may be ruptured without force with the aid of a steel probe, in the examination therefore of doubtful cases it is best to divide the body of the uterus longitudinally, through the middle of its anterior wall, and then cautiously to divide with scissors the anterior wall, down to the internal orifice. Examination of the internal orifice from above downward, or a superficial examination with a whalebone probe, will always enable one to form a correct idea of this condition. When fibrous tumours grow from various points into the distended uterine cavity, and flatten after coming in contact, there is frequently found a loose connection of the tumours by a delicate connective tissue, and in consequence of the coalescence of these growths,

an obliteration of the uterine cavity results, which is much altered from its original form, and is only represented by the interstices between the tumours. In this way a partial or complete atresia of the superior portion of the cavity of the uterus may take place, these tumours being only exceptionally developed from the walls of the cervix. In such cases also the uterine mucous membrane is considerably thinned, and sometimes fissured or absorbed by pressure, in consequence of which a kind of denuded patch is formed, from which the agglutination commenced.

A singular atresia at the external orifice, which occurs in prolapsus uteri, especially when combined with complete inversion of the vagina, must not be omitted. In many cases of prolapsus we find in place of the external orifice, only a shallow depression; sometimes even this slight indication of the cervical canal is absent, and it is difficult to determine from external appearance where the point of entrance should be. If such a prolapsed uterus is bisected, it is observable that the atresia of the external orifice is formed by a milk-white cuticle varying in thickness, (sometimes 1 line) sometimes distinctly opalescent at the cut edges, and a close examination of which shows that it consists of vaginal epithelium, disposed in manifold layers, vegetating into thick strata in a manner similar to that of the vagina. Such may have been the condition in those cases in which a slight atresia of the external border of the os uteri was described as being a white membrane.

I deem it improper however, to apply the expression *agglutination* to an occlusion by tissue, or, as Schmitt did, *obliteration* to a larger extent.

In my opinion there is no reason for retaining this old expression.

Undoubtedly in some cases of obliteration by epithelial tissue, a more substantial occlusion by connective tissue takes place, which is, however, often limited to the extreme end of the canal.

In rare instances, atresia of the external orifice may result from cicatrization of deep ruptures or contusions, after labor.

The consequences of atresia and stricture are similar; atresia, as mentioned, may be considered as a consequence of stricture. The further consequences of both affections are very different, according to the age of the patient, especially in relation to menstruation and the condition of the mucous membrane.

If atresia occurs in a menstruating female, distention from accumulated menstrual blood above the point of atresia, or hæmatometra, will be the consequence. When atresia occurs in a female who has ceased to menstruate, the consequences will depend on the condition of the uterine mucous membrane. The latter frequently continues active, or may even be affected with catarrh. Therefore an accumulation of mucus and its consequent effects, or a so-called hydrometra, will result, in which the quality of the mucus will depend upon the situation of the atresia. In aged females, especially those affected with rigidity of the arteries, atresia of one or other uterine orifice may be found with inconsiderable or no distention of the uterine cavity above the atresia, which condition is owing to diminished secretion of the uterine mucous membrane. Notwithstanding the long duration of an atresia, we sometimes meet with only a small quantity of honey-like gummy mucus in the cavity (which is scarcely distended) above the point of occlusion.

Stenosis and atresia of the gravid uterus are very interesting and important in their immediate consequences, as they frequently constitute an impediment to delivery. They affect almost exclusively the external orifice, and atresia in such cases is chiefly produced by a slight union of the eroded edges of the external orifice.

Kiwisch thought that atresia of the gravid uterus might possibly occur in consequence of the formation of a kind of decidua in the cervical portion, representing an agglutinating intermediate

layer, which afterwards, when the canal is distended, is increased into a membrane of varying density.

That form of atresia which has been described by many as *acquired mucous atresia* of the external orifice, with or without absence of the vaginal portion, I have never had occasion to observe, unless the above-mentioned adhesion by epithelial tissue be meant by it; neither is the condition itself sufficiently clear to me from the description given, and I cannot well understand how the mucous membrane can occlude the external orifice, except in congenital atresia.

In isolated cases, especially after the developement of hæmatometra, a rupture of the occluding membrane occurs. It is also ruptured during labor when it is inconsiderable.

HYDROMETRA, DROPSY OF THE UTERUS.

Literature: Vesalius, De corpor. human. fabric. Lib. V. cap. 9. pag. 627. — Morgani, De sed et caus. morb. Ep. XLV. art. 16, 21, 23; Ep. LXIX. art. 46. — Chambon de Montaux, Merkwürdige Krankengesch. und Leichenöffnungen. pag. 546. — Geras Constantini de Gregorini, Diss. de hydrope uteri. Halae 1795. — El. v. Siebold, Frauenzimmerkrankheiten, I pag. 532. Frankfurt 1811. — Wirer, Journ. f. chir. Geburtsh. u. gerichtl. Arzneik. Jena 1802. Bd. IV. 2. — Blanchard, Anatom. pract. rat. Cent. II. obs. XXIX. pag. 242. — Thomson Med. chir. Transact. of London Vol. 13. — Carus, Handb. der Gynäcologie. Leipzig 1820. pag. 285. — Boivin et Dugès, Traité pr. etc. Paris 1833. Bd. 1. pag. 255. — Hooper, The morbid anat. of the uterus Pl. 3. — Andral, Précis d'anat. patholog. Bruxelles. 187. II. pag. 245. — J o b e r t. Journ. de Chirurg. Août. 1843. — Förster, Spec. path. Anat. Leipzig 1854. pag. 293. — C. Braun, Lehrb. d. Geburtsh. Wien 1857. pag. 534, und Zeitschr. der Ges. der Aerzte. Wien 1858. Nr. 17.

By dropsy of the uterus we understand an accumulation of serous or mucous fluid within its cavity. It is generally the immediate consequence of stricture or atresia of the orifices, and occurs in its true form only after the cessation of menstruation.

If the efflux of uterine mucus secreted in considerable quantity, be impeded by the above-mentioned causes, it accumulates in the cavity of the body of the uterus when the impediment is situated at the internal orifice, and in the cavity of the cervix, when it exists at the external orifice. In rare cases also of stricture of both orifices, accumulation of fluid takes place in the cavity of the body as well as in that of the cervix.

In stricture of the internal orifice the cavity of the body of the uterus dilates in such a manner as to become globe shaped; its walls are uniformly distended, and in general are found in a state of eccentric hypertrophy. If the distention attains a higher degree the uterus is finally transformed into a thin-walled sac with inelastic walls. Investigations, especially of cases of considerable hydrometra in aged females, show that the elements of connective tissue predominate considerably over those of muscular tissue and we must assume that the latter are chiefly destroyed by the distension, and that the hyperplasia accompanying nearly every case of hydrometra, chiefly affects the connective tissue.

When the cavity of the body of the uterus is considerably distended, its mucous membrane becomes thin and degenerates, and its external soft velvet-like appearance is lost, its surface assuming the smooth, glossy appearance of serous membranes. If the uterus be further distended it becomes net-like in appearance, and is finally changed into a soft layer of connective tissue covered with a single layer of frequently degenerated cylindrical epithelial cells. The latter generally, and in the higher degrees of hydrometra, always lose their ciliæ, and appear shorter and thicker, resembling the so-called *transitory* epithelium. I have been unable, even in the highest degree of hydrometra, to discover the pavement epithelial cell, which is found in analogous conditions of the gall bladder. The glands of the uterine mucous membrane in the commencement of hydrometra, are generally affected with a fatty degeneration of their epithelium, and are finally destroyed,

leaving indurations in the mucous membrane. Sometimes also the utricular glands degenerate into small cysts.

The fluids contained in the cavity of the uterus are at first a viscid mucus, sometimes clear or serous, sometimes slightly turbid and yellowish or brown in color. In many cases of atresia after menstruation has made its appearance for a short time only, or several times and then ceased, a hæmatometra formed at first, may turn into hydrometra, and the hæmatine being changed into brown pigment, may give a peculiar color to the fluid. Upon closer investigation we find varying quantities of cast-off epithelium and colloid bodies suspended in a mucus fluid. After a longer continuance of hydrometra however, we generally find the contents strongly alkaline, very fluid and nearly or perfectly clear. The mucous substance contained in the secreted fluid may have been dissolved by its alkalescence.*

In stricture of the external orifice the cervical canal is distended like a pouch, and we may mention that the cavity of the uterus participates only slightly in the enlargement. Frequently enough I have observed pouch-like distention of the cervical canal without dilatation of the uterine cavity. In every such case there was stricture only at the external orifice. Obstruction of the cervical canal being the chief cause of distention of the cavity of the uterus, we are led to assume that in such cases there is no hypersecretion of the uterine mucous membrane, consequently that the cervical mucous membrane alone is diseased, or, which seems possible, that although the cervical catarrh may be most severe, a slight catarrh of the uterine mucous membrane may co-exist, but that a temporary emptying of the cervical canal occurs from time to time and the uterus distended by accumulated fluid, contracts and temporarily assumes its former size, whilst the less muscular cervix is distended to its utmost at an earlier period and remains

* According to Berzelius mucous substances are soluble in alkalies.

permanently distended. The temporary evacuation of accumulated cervical mucus is occasioned, I think, by its liquification, and by pressure of the secretion in the cavity of the uterus.

The fluid accumulated in the distended cervix is the well-known limpid and extremely viscid mucus, which is often found in the normal cervical canal, between the menstrual periods; and here also there is a possibility that with increasing alkalescence it may become more fluid. Kiwisch especially calls attention to the periodical discharges of hydrometra in cases of obstruction of the canal by simple flexion.

Finally, in rare cases, with stricture or atresia of both orifices we find distention and dilatation of the cavities of both body and cervix, each possessing the characteristics common to their separate distensions. The cavity of the body is distended in the shape of a globe, the cervical canal in the form of a pouch; the distention of the former always being the greatest. In such cases the uterus acquires the hour-glass shape; and by this term pathological anatomists generally understand an alteration in form produced by hydrometra.

In hydrometra we always find the uterus in a state of hypertrophy, for although in the highest degrees of this disease the walls of both the body and the fundus are exceedingly thin, still, on the whole, the uterus possesses more substance than in its normal condition. The mucous membrane of the affected portion is always in a state of catarrhal tumefaction. In the higher degrees of hydrometra, the globe-like body of the uterus gradually ascends into the abdominal cavity, and appears above the pubes as a round fluctuating tumour, excepting when the organ has previously been dislocated, as in ante-flexion, or, which is more frequently the case, in retroflexion. If the latter be the case in the slighter degrees, the uterus is straightened, unless the promontory of the sacrum is very large, but otherwise it is impacted in Douglas' space and presses upon the posterior fornix as a fluctuating tumour, and besides im-

peded defecation, all those consequences of retroflexion occur, which we have mentioned under that head.

All the forms of stricture or occlusion of the orifices mentioned in the preceding chapter, become causes of hydrometra when catarrh of the uterine mucous membrane and hypersecretion occur in a non-menstruating uterus. During the years in which conception may occur, hydrometra is rarely observed, and can only occur with complete *amenorrhœa*. It is therefore most frequently observed in aged females.

In regard to the quantity of accumulated secretion, the old observations quoted by Voigtel must be received with caution. Although Vesalius pretends to have evacuated 180 pounds and Blanchard 185 pounds from a distended uterine cavity, notwithstanding all the respect we have for these authorities, we are led to suspect that in these instances an ovarian cyst, lying close to the thin-walled uterus affected with atresia of the internal orifice, may have been mistaken for the uterine cavity. Of the more recent cases the one described by Kiwisch must be considered as one of the most considerable as to the amount of fluid—two pounds of fluid being found in the uterine cavity, which was distended to the size of an adult's head. Thomson mentions a case of hydrometra in which the uterus attained the size of one at the full term of pregnancy. In the cervical canal the quantity of accumulated mucus seldom exceeds an ounce, and generally it is only one or two drachms.

Hydrometra has no consequences worthy of note, except when it is combined with displacements of the uterus and especially retroflexion. Sometimes, although the cervical canal be completely occluded and the mucous membrane considerably softened, as in catarrh, but a very small amount of mucus accumulates. As this only occurs in marastic females, we presume that hypersecretion could not take place in such.

Obstetricians also describe a dropsy or *hydrops* of the gravid uterus, in which after the fifth month a considerable

quantity of fluid is said to flow periodically from the organ without miscarriage ensuing. Dugès considered this to be the allantoic fluid, abnormally increased, and proposed to call it *hydrallante*. In recent times Ingleby, Dubois and Dugan concurred in this opinion. Gregorini had already distinguished accumulation of water within the ovum from that between the chorion and amnion, and also from that between the chorion and the walls of the uterus. Nägele considered the fluid the product of a secretion of the uterus, which from disturbed endosmosis does not penetrate the membranes of the ovum. C. Braun considered hydrorrhœa as the product of a serous endometritis which detaches a portion of the chorion, and in consequence of which the fluid accumulates in larger or smaller spaces, which, according to their proximity to the os, are sooner or later emptied. Of course there are no pathological observations of this condition, and I only mentioned this affection for the purpose of completing this subject, remarking at the same time that C. Braun's opinion must be considered the most credible. The microscopical examination of a placenta expelled after hydrorrhœa, exhibited a new-formation on its convex surface resembling a fine membrane consisting of connective tissue (Wedl).

INFLATION OF THE UTERUS, TYMPANITIS UTERI, PHYSOMETRA.

Literature: J. Astruc, *Traité des malad. des femmes*. Paris 1761. — Voigtel, *Path. Anatom.* Halle 1805. Bd. III. p. 514. — Henning, *Hufeland's Journ.* etc. 1817. — Düsterberg, *Rust's Magaz. f. d. ges. Heilkunde*. 1825. — Tessier, *Sur la tympanite de la matrice*. *Gaz. med.* 1844. 1. — Szerlecky, *Physometra*. *N. Zeitschr. f. Gebtsk.* Berlin. VII. 3. 1856. — A. Valenta, *Ueber Tympanites uteri*. *Zeitschr. d. Ges. d. Ae.* Wien. 1857. Nr. 7 und 8.

By physometra, gynæcologists understand an accumulation of gases in the uterine cavity.

Different opinions were formerly advanced in regard to the nature of these accumulated gases. Thus the old gynæcologists believed it must have been introduced into the uterine

cavity from without, others advanced doubtful hypotheses as to the generation of the gas by the uterine blood-vessels, or from a peculiar chemical composition of the uterine secretions, in virtue of which, gas was said to be spontaneously developed.

From a physiological and pathological point of view, we may say in regard to the origin of physometra, that under certain circumstances the possibility of the mechanical introduction of gas does seem probable, as when the uterus is relaxed at the moment of expulsion of the foetus, and does not contract as its contents are expelled. In regard to a peculiar chemical quality of the uterine secretions there is little to say. But it is a fact, that gases resulting from decomposition may collect in the uterus if their escape is prevented, and that in the various pathological processes to which the uterus is subject there is sufficient cause for the production of such gases. Valenta, independently of the undoubted possibility of the introduction of air from without, considers two conditions necessary for the production of tympanites uteri; *first*, that there must be some decomposing substance in the uterus, and *secondly*, that the escape of the products of the decomposition be prevented.

The substances which are likely to be decomposed in the uterus are generally those connected with pregnancy and labor; either a dead foetus, remnants of membranes, portions of the placenta, or coagulated blood. But besides these, the various tumours, especially carcinomata, by decomposing, may lead to physometra, or it may result from hæmatometra or hydrometra (Scanzoni).

The condition of the inner surface of a physometrous uterus therefore, differs according to the pathological process which causes the formation or accumulation of gas. Distension of the uterine cavity by gases seldom attains a high degree. From analogy, we easily arrive at the conclusion that gases arising from decomposition may enter the oviducts when open, and thus escape into the peritoneal cavity, where they must

give rise to general peritonitis. Still no reliable cases of such a kind are recorded.

Physometra, according to what has been said, is always a secondary affection.

In regard to the impediment offered to the escape of the accumulated gases, it is not always caused by stricture or atresia, or spasmodic contraction of the uterus below the accumulation; but the gas which has been developed, may also be retained in consequence of a passive condition of the uterus, or a loss of power of the distended cavity to contract.

HÆMATOMETRA.

Literature: Kreiner Hufeland's Journ. Sept. 1834.—Brodie, Lancet. Nov. 1839. — Kiwisch, Klin. Votr. Bd. I. p. 210. II. p. 214. — Seyfert, Hæmatometra, Prag. Vierteljahrsschr. 1854. I. p. 132. — Schuh, Verwachsung der Scheide mit Zurückhaltung des Menstruations-blutes, etc. Zeitschr. d. Ges. de. Ae. Wien, 1857. Wochenbl. Nr. 31. — Baker Brown, Lancet I. 19. 1860. — C. Braun, Ueber Hæmatometra in den Pubertätsjahren. Allg. Wien. med. Zeitg. 1861. Nr. 13 und 53. — Patry, Gaz. des hôpit. 18. 1861. — Prell, Monatschr. f. Geburtsk. etc. Berlin Decemb. 1861.

By hæmatometra, strictly speaking, we understand an accumulation of blood in the non-gravid uterus.

According to the amount of the accumulation the uterus is distended in various degrees, and after this has continued for a length of time, its walls are almost always hypertrophied. On section, the substance of its walls appears pale, often milky white, congested and peculiarly soft, but still resistant. After the uterus has been considerably distended, a thinning of its walls becomes apparent, yet the amount of its substance is much greater than in its normal state.

The accumulated blood is mostly dark, deficient in fibrin, discolored in various degrees to a blackish brown, thickened rather than coagulated, tar-like, and sometimes mixed with crystals of cholestearine. The inner surface of the uterus is smooth, reddened, or dark brown.

Hæmatometra is generally caused by the collection of men-

strual blood, in consequence of atresia of the genital canal. These atresiae occur most frequently in the vagina from congenital or acquired causes, or from imperforation of the hymen. Congenital or acquired closure of the external genitals is a less frequent occurrence, and atresia of the external orifice and cervix uteri the most rare. Seyfert denies that the thickened and imperforate hymen is a most frequent cause of hæmatometra. He found it to be more frequently owing to atresia of the vagina at a higher point. According to the situation of the atresia, various portions of the genital canal may be distended; and, as a rule, that portion of the canal suffers most distention which is immediately above the atresia.

If atresia occurs at the labia majora, the vestibulum and vagina are considerably distended, the uterus being only slightly affected, until the distention attains a certain degree. The vagina in like manner only participates in the distention, if an imperforate hymen causes the retention of menstrual blood. This distention likewise is called *hæmatometra*, therefore wrongly, since the uterine cavity in most of these cases is not distended. Seyfert also considers the use of the term hæmatometra, in all cases improper as a general one, and requires an exact description of the point at which the passage of the fluid is prevented. The distended vagina forms a round sac, which, according to the thickness and elevation of the occluding membrane, appears as a more or less elastic distended tumour, of a bluish-red color, and which reaches down to the entrance of the vagina or the vestibulum. If an imperforate hymen forms the occluding membrane, it is thin and smooth, but if atresia is caused by cicatricial contraction of the vaginal walls, the lower part of the sac is thick and dense. The vaginal portion of the uterus is raised out of the vagina, the duplication effaced, and the anterior and posterior fornix come together like a vault, at the highest point of which the uterus is implanted. Posteriorly the uterus presses upon the rectum, anteriorly upon the

bladder, especially upon its neck and the urethra. The uterus is elevated, and its fundus frequently inclined forward.

If the atresia is located at the uppermost portion of the vagina, or at the external orifice, the cervical cavity is distended like a large sac, and the cavity of the uterus proper always, though to a less extent, participates in the distention. Thus we may find a small cavity, resulting from distention of the superior part of the vagina, and above this a much larger one, caused by distention of the cervical cavity, which, in its upper portion communicates with a smaller cavity formed by distention of the cavity of the uterus proper (compare Schuh's case).

Lastly, if atresia of the entire cervical canal or internal orifice exists, which but rarely happens, the uterine cavity will be distended in the form of a globe, or round tumour.

In relation to the cause of atresia, the two cases of Braun, in which atresia of the cervix and hæmatometra, followed amputation of the vaginal portion, are very interesting. Krüner states that hypertrophy of the vaginal portion may also lead to a contraction of the cervical canal, and thus hinder the escape of menstrual blood.

This imperfect dilatation of the genital canal, is only met with in slight degrees of hæmatometra. After the distention has reached a certain degree, the remainder of the above canal is so affected, that a uniform cavity is formed, in which no subdivisions are recognizable. In atresia of the hymen, or external genitals alone, the distention, when extreme, is chiefly confined to the vagina, and therefore the term HÆMATOMETRA is inappropriate to this condition.

The oviducts in many cases, are also said to participate in the distention by menstrual blood.

It is certain that the menstrual blood which is poured out, contains less fibrin than is found in other extravations, and, as is well known, it was considered absolutely deficient in fibrin (Simon, Vogel), until Weber and Henle demonstrated its presence. But in retained menstrual blood however, fibrinous coagula

have never been found, and we must therefore presume that in such cases the fibrin is soon decomposed. I have also seen in a tar-like fluid of this kind, shreds similar to those found on the walls of old aneurisms whose fibrin had commenced to degenerate. But, according to what has been said, a permanent coagulation of the fibrin adhering to the walls of the cavity does not seem to take place in hæmatometra.

Hæmatometra is most frequently met with during puberty, for the reason that the atresiae causing it are most frequently congenital. It may exist for a long time, and attain an excessive degree, but the amount of blood never equals in quantity that which we suppose would have been poured out in normal menstruation. Undoubtedly, between the menstrual periods, the retained blood is considerably thickened by absorption. Over 10 pounds have been found. The filling of the uterus or vagina may lead to extreme distention of their respective walls.

In consequence of this distention of the uterus, peritonitis frequently ensues, and firm adhesions are formed between the neighboring organs and uterus.

If the contents of the uterus decompose, the gas formed in consequence may produce *physohæmatometra*. The walls of both the uterus and vagina may become gangrenous, or *metritis* and *colpitis* may lead to their ulceration and rupture.

Kiwisch observed a rupture of an oviduct from the entrance of blood from the uterine cavity into it, and probably Schuh's case must be similarly explained; although the orifice of the oviduct was found closed after death, and the rupture in this case was the result of an ichorous process. Brodie mentions that in many cases partial evacuations of the accumulated blood may take place, through the oviducts into the peritoneal cavity.

The extension of inflammation from the pelvic to the rest of the peritoneum, often causes hæmatometra to terminate fatally, even where rupture, or evacuation through the oviducts does not occur.

III. ADVENTITIOUS GROWTHS OF THE UTERUS.

1. NEW-FORMATIONS OF CONNECTIVE TISSUE.

THE new-formations of connective tissue which take place in the substance of the uterus, are developed from its interstitial tissue, and in their growth affect either the whole extent of the latter, or isolated portions of it in a diffuse manner; or, these new-formations, becoming independent, are situated under various circumstances in circumscribed portions of the uterine substance; or, lastly, they are considerably separated from the rest of the tissue of the organ. According to these different relations to the parent tissue, these varieties of new-formation of connective tissue must severally be considered.

A. DIFFUSE GROWTH OF CONNECTIVE TISSUE IN THE UTERUS. CHRONIC INFARCTUS OF THE UTERUS (KIWISCH).

Literature: Lisfranc, *Gaz. méd. de Paris*. Nr. 61, 64, 73. 1833. — Simpson, *Monthly Journ.* Juni, Aug., Nov., 1843, und March 1844. — Kiwisch, *Kl. Vortr.* Prag 1845. I. pag. 104. — Jäsche, *Erfahrungen über die chron. Gebärm. Entzündung.* *Med. Zeitg. Russlands* 1846. Nr. 22 and 28. — O. Prieger, *Ueber Hypertrophie und die harten Geschwülste des Uterus.* *Monatschr. f. Geburtsk.* Berlin 1853. März. — Scanzoni, *Krankh. d. weibl. Sexualorg.* Wien, 1857. pag. 141. — Oppolzer, *kl. Vortr. etc.* in *Wittelshöfer's med. Wochenschr.* Wien 1858. p. 328.

IN consequence of formative irritation, especially when it has existed for a long time, the whole uterine connective tissue sometimes proliferates either with accompanying increase of the muscular substance, or, if this does occur, the connective tissue predominates to such an extent that the muscular substance is comparatively of not much account. By this process, an increase of the substance of the uterus is produced by a portion of its tissue, which, as regards function, cannot be considered as the most essential to the organ. I therefore do not hesitate to classify this affection with the qualitative alterations of formative irritation, inasmuch as the natural proportion of the normal tissues constituting the uterus are thereby considerably altered.

In this disease the uterus is uniformly increased in its diam-

eters, though not always in all of them; its body and fundus generally assume a spherical shape, and frequently attain the size of a man's fist, and even larger. Its walls are sometimes considerably increased in thickness, up to 12 or 15 inches, especially the posterior one and the fundus. The cavity of the uterus is absolutely enlarged, chiefly elongated; but the uterine walls lie close together, and an increase of its cavity, in the general meaning of the term, is only met with in rare instances. I should rather say that the cavity of such a hyperplastic uterus was relatively smaller than that of a normal one. Exteriorly the fundus uteri appears rounder and broader, the anterior and still more the posterior walls thickened, the latter even vaulted or of the shape of a boat's keel, the cervix more ample and increased in substance, and the vaginal portion broader and thicker.

The condition of the parenchyma of the uterus varies according to the duration of the disease. In the first stages it is more congested and turgid, owing to the immatured condition of the newly-formed connective tissue. The longer the duration of the disease, the more is the mucous connective tissue transformed into the fibrillary variety, accompanied with contraction of tissue; the parenchyma on section appears white, or of a whitish-red color, deficient in blood-vessels from compression of the capillaries by the contraction of the newly-formed connective tissue, or from partial destruction or obliteration of vessels during the growth of tissue; the firmness of the uterine substance is also increased, simulating the hardness of cartilage, and creaking under the knife. The newly-formed tissue is chiefly composed of thin fibrils, deficient in nuclei, which cross the uterus in lines of various breadths in all directions, forming a complicated felt-like network, and constituting the greater substance of the uterus. In the first stages of the disease the muscular fibres are broader and hypertrophied, but at a later period may be completely lost in the proliferation of connective tissue.

The causes of this diffuse growth of the connective tissue must be sought for in habitual hyperæmia, and I cannot concur in that explanation which interprets the process described, as chronic inflammation. It is true that inflammatory derangement of nutrition is often followed by proliferation of connective tissue, but it is impossible to conclude, that from the presence of this formative irritation derangements of nutrition are produced which are essentially of a destructive character.

Diffuse growth of connective tissue constitutes the so-called induration hitherto considered as a result of parenchymatous inflammation of the uterus.

Frequently this proliferation of connective tissue is developed after repeated deliveries in rapid succession, without any previous or existing inflammation. It also occurs in many displacements of the uterus, especially those in which venous reflux is hindered in consequence of traction of the uterine appendages. When tumours exist, especially fibrous, proliferation of connective tissue almost always coexists in the rest of the uterus. When the uterine cavity is distended by accumulated mucus or menstrual blood, this proliferation generally exists in the form of eccentric hypertrophy. Finally it is often combined with the various tractions to which the uterus is subject, and sometimes is developed in consequence of the puerperal condition.

From the description of this affection it is evident that the term "infarctus" used by some gynecologists is absolutely improper. For reasons mentioned I would also advise the disuse of the term "chronic inflammation."

In most cases the mucous membrane of the vagina participates in the chronic irritation, we frequently finding it in a state of epithelial desquamation, and even of catarrh, and blennorrhœa. The peritoneal covering of the uterus is generally thickened and covered with various-shaped false membranes. The

pampiniform and utero-vaginal plexuses are often in a varicose condition, and this is not only caused by the contraction of the blood vessels, but is also frequently the consequence of the same cause which produced the diffuse growth of the above tissue.

Besides local hyperæmia, we must take into consideration the general causes of this affection; thus it is often found complicated with diseases of the heart. Scanzoni calls particular attention to the fact that proliferation of connective tissue repeatedly occurs after successive miscarriages, and is also said to be met with in prostitutes.

When the diffuse growth of the above tissue does not take place uniformly in all parts of the uterus, hyperæmic distension of its blood vessels is apparent in those portions not at all, or only slightly affected, and in these parts extravasations may occur, especially in the external or internal layers of the uterine tissue (Scanzoni).

The consequences of these pathological conditions are, derangements of menstruation and sterility. As regards their termination, it must be noted that in the majority of cases, the proliferation gradually ceases after attaining a certain degree, and no further alterations of tissue take place. In other cases, at the climacteric period, involution occurs, commencing generally by distension of the uterine cavity with an accumulation of mucus. What has been said by various authors on the relations of diffuse growth of connective tissue to the development of carcinoma, must be considered as a mere hypothesis; this same question has been raised in regard to other organs in which carcinoma is developed from a hypertrophy of tissue, and in a great many cases it must be left to the discretion of observers, whether they will classify certain cases with carcinoma.

In the preceding description I have only spoken of that proliferation which uniformly affects the entire interstitial connective tissue of the uterus, we shall next consider the equally

important analogous conditions which only affect portions or layers of the uterus.

And first we consider as such :

E. DIFFUSE PROLIFERATION OF CONNECTIVE TISSUE IN THE VAGINAL PORTION, HYPERTROPHY, PROBOSCIS—OR POLYPUS-LIKE ELONGATION OF THE VAGINAL PORTION OF THE UTERUS

Literature: Krimer, Hufeland's Journ. Septbr. 1834. — Kennedy, Dublin Monthly Journ. Novbr. 1838, Froriep N. Not. 1839. Bd. IX. pag. 736. — Malgaigne, Traité d'anat. chirurg. Bruxelles 1838. pag. 386. — Simpson, Monthly Journ. June, Aug., Novbr. 1843 und March 1844. — Osiander, Hannov. Annal. N. Folge. V. I. — Cruveilhier, Anat. patholog. Livr. 39 Pl. 3. Fig. 2. — Kiwisch, Klin. Vortr. I. pag. 111. — Virchow, Ueber rüssel-förmige und polypöse Verlängerung der Muttermundslippen, Archiv. Bd. VII. pag. 164. 1854, und Verhandl. d. Ges. f. Geburtsk. Berlin Bd. II. pag. 204, und Bd. IV. pag. 11. — Herpin, Gaz. méd. de Paris. 1856. Nr. 1 u. 2. — E. Wagner, Beitr. zur norm. und path. Anatomie der Vaginalportion, Arch. f. physiolog. Heilkunde, 1856. 4. pag. 493. — Breslau, Diagnostik der Tumoren des Uterus ausserh. der Schwangersch. u. des Wochenb. etc. München 1856. — Scanzoni, Krankh. der weibl. Sexualorg. — Huguier, Union medic. 1859. Nr. 32—48. — C. Braun, Wiener med. Wochenschr. v. Wittelshöfer, 1859. Nr. 30. 31. — Scanzoni, Beitr. zur Geburtsk. u. Gynäcol. IV. pag. 329. 1860. — Matecky, Tygodnik lekarsky. Nr. 30. 1860.

Hypertrophy of the vaginal portion, as this condition is universally called, consists of nothing more than diffuse and excessive growth of connective tissue, and may affect the whole vaginal portion or either of its lips. This, accordingly, at once gives rise to various forms. Further varieties result according to their form, and according as the mucous follicles of the vaginal portion participate or not in the affection. In the majority of cases, the increase of the entire vaginal portion by this disease, is exclusively in its length. Consequently, the external orifice extends further down, and the vaginal portion forms a cone extending low down in the vagina, which is either perfectly smooth, fissured, or scarred, and resembles a tonsil in appearance, (Virchow). In the former case we find, in females who have not borne children, that both lips, which

have been increased in breadth and length, surround the os as transverse slits. Frequently, however, the enlargement and elongation of the anterior lip is so excessive, that the os is situated at the posterior part of the conical tumour, and its entrance is of a crescentic shape, with superior and lateral margins, which are frequently seen at the posterior surface of the anterior lip, forming ridge-like prominences; or the vaginal portion appears cylindriciform, its inferior extremity being frequently either obliquely flattened posteriorly by pressure of the posterior wall of the rectum, or perfectly round with a circular opening in its centre leading into the cervical canal. The second form above mentioned, is only found in females who have borne children; in these we meet with shallow or deep insections, corresponding to previous lacerations of the vaginal portion. It is evident that the different forms of the normal vaginal portion will cause varieties of the so-called hypertrophic forms. Thus I have before me a specimen of a virgin uterus affected in this manner, the vaginal portion of which is $1\frac{1}{2}$ inches long, tapering downward like a cone, and obliquely truncated at its lower portion (Tapiroid neck, Ricord).

If the diffuse growth of connective tissue affects only one lip, it assumes the form of a flattened, somewhat circular cone; if it be the anterior lip, the os is found at its posterior surface, if the posterior lip, of course on the anterior surface. Generally the elongation affects the anterior lip of the cervix.

A peculiar form described by Virchow under the name of *polypus-like elongation* of the lips of the os uteri, is evidently caused by a disease of the mucous follicles of the vaginal portion, in consequence of which they degenerate into cysts, and finally rupture. This cystic degeneration takes place under the influence of an irritation, affecting in like manner the connective tissue of the vaginal portion and causing it to proliferate profusely. In consequence of this, and the considerable enlargement of the follicles, the vaginal portion is considerably

enlarged, either in its entirety, or chiefly in its anterior lip, which enlargement may result in the formation of tumours the size of a fist, the surfaces of which, however, are not smooth, but uneven and knotty, and traversed by deep fissures and grooves, which circumstance caused Virchow to compare these tumours, as regards both their external and internal appearance, with enlarged tonsils. If a sound be introduced into these fissures, it sometimes passes into regular sacs, which extend as far as the base of the tumour, and the cavity of which is always larger than their orifices.

If the entire vaginal portion is thus affected, it forms an irregular tuberos mass, which from mere manual examination might easily be confounded with carcinoma. The latter forms differ from those of enlargement, previously mentioned, in which only elongation is found, in this respect, that in these there is also considerable increase in breadth. This explains why these growths, when arising from either lips, and attached to the cervix by a pedicle, were described as pedunculated polypi of the vaginal portion.

The transitions from these last-named forms to those previously described as having smooth surfaces, are formed by those elongations which have been called proboscis-like tumours, which affect either of the lips, and are smooth on the surface which lies in contact with the vagina, but velvet-like, wrinkled, and villous on their inner surface, which is also covered with large funnel-shaped depressions (Virchow and Kennedy).

The substance of such an elongated vaginal portion is generally succulent, of a grayish-red color, exceedingly vascular, and exhibiting on section lines of white fibres. Under the microscope we find connective tissue composed of thin fibres deficient in nuclei, in which tissue Virchow first found numerous arterial vessels with quite thick walls, and measuring upward of 0.11 of a millimetre in breadth. It is well known to gynecologists, that frequently after the removal of such polypous elongations of the vaginal portion, hæmorrhages

have ensued which were difficult to control. In such cases the epithelium is always exuberant, and covers the external surface of the tumour in thick layers.

Having recognized the depressions mentioned as enlarged cysts and ruptured follicles, it is highly probable that the elongation of the vaginal portion is owing to this affection. Catarrh of the mucous membrane of the vaginal portion may therefore be considered as a cause of elongation of the latter. Still, without doubt, other circumstances must be considered, especially in those cases in which the inner surface of the elongated vaginal portion is found to be smooth, as I have frequently seen; and here Kennedy's statement, that frequent pregnancy and labor predisposes to this affection, may be of some interest, for this condition is found much more frequently in females who have borne children. Scanzoni also attributes this affection to contusion of the vaginal portion during labor.

The degrees of this affection are various, monstrous elongation, especially of the anterior lip, having been observed (Matecky's case measured 5 inches in length). The lower portion of the elongation may even appear outside the labia.

The consequences of this disease, according to experience, are first, sterility, which may arise from considerable displacement of the os, for there are cases mentioned of conception occurring after amputation of the elongated vaginal portion (Petrequin, Dupuytren). Catarrh and leucorrhœa are generally combined with elongation of the vaginal portion, and erosions readily occur on the tumefied parts, especially when the latter extend far down in the vagina or between the labia; in the former case adhesions are said to be sometimes formed between the walls of the vagina and the elongated vaginal portion of the uterus. If conception should take place notwithstanding this condition, œdema of the elongated parts may offer an impediment to labor. In a girl who died after parturition and whose body was examined in Rokitsky's anatomical institu-

tion, I found the posterior lip of the os uteri lacerated transversely in such a manner, that its inferior margin was hanging down and the fornix vaginae was ruptured as far as Douglas' space (1859).

Although enlargement of the vaginal portion of the uterus by diffuse growth of its connective tissue, is frequently found combined with stricture of the canal, as was the case in a patient seen by Krimer, in whom hæmatometra had occurred, still, there are cases known in which the external orifice was so much enlarged, that the cervical canal assumed the form of an infundibulum with its larger opening below, and the lips of the cervix were so tumefied that they appeared everted (Tyler Smith, Virchow). (See chapter on INVERSIONS OF THE UTERUS). This affords a clue to the origin of elongation of the vaginal portion of the uterus, and these very cases prove that enlargement and cystoid degeneration of the follicles are not the only causes of the above condition, but on the contrary, that they only produce elongation of the inner lining of the vaginal portion, ending in eversion of its inner surface. If formative irritation extend over the whole vaginal portion the latter is more uniformly elongated. From an inspection of the thick polypoid elongations of the vaginal portion with fissures and depressions, we see that these irregularities of surface are always on the inner surface, or the external and inferior margin, which fact proves that in such cases an outgrowing of the hypertrophied inner lining has taken place. It is, therefore, not to be doubted that the degeneration mentioned stands in causal relation to the polypus-like elongation or intumescence of the uterus, and that in consequence of it, elongation of the entire vaginal portion may take place by the extension of the growth of connective tissue to its external lining; but it is also undoubtedly true that the elongation of its external lining must not necessarily follow, and also that entire or partial proboscis-like elongation of the vaginal portion may take place without an affection of the follicles or independent of them.

Proboscis-like and polypus-like elongation of the vaginal portion might be confounded with a descent of the uterus into the vagina, but the length of the vagina in the above affection affords a valuable criterion. It would be easier to mistake it for elongation of the cervical canal and eversion of the vagina; in such cases our safety lies in the normal length of the vaginal portion being demonstrable; the shortness of an inverted vagina should also be remembered. We especially allude to those cases of which Virchow has given so excellent an illustration in his case of prolapsus uteri without descent of its fundus. A condition nearly related to this is

C. DIFFUSE GROWTH OF CONNECTIVE TISSUE IN THE CERVICAL PORTION OF THE UTERUS.

The cervical portion of the uterus may become affected with diffuse growth of connective tissue similarly to the vaginal portion. When such is the case its walls thicken and elongate, which latter condition is not imaginable without co-existing inversion of the vagina. The cervix may increase three inches in length, and consequently the external orifice may appear between the vulva, and form a prolapsus without sinking or descent of the fundus (Virchow). Huguier consequently makes a distinction between hypertrophic elongation of the vaginal portion and that portion of the cervix situated above the fundus of the vagina, and, in the latter case, he contends that the vaginal portion is always hypertrophied but never elongated, and the body and fundus uteri at the normal elevation. Still, according to Huguier, this affection may be combined with hypertrophy of the body and fundus and thus cause true descent of the uterus. The walls of the cervix when affected with diffuse growth of connective tissue are remarkably dense and firm, and its cavity is sometimes either contracted or dilated and filled with a glazy viscid mucous.

I must remark, in regard to this proliferation of connective tissue in the cervix, that it is easily mistaken for fibrous carcinoma, especially on account of their presenting nearly the same

external appearance, and because fibrous carcinoma is likewise generally limited to the cervical portion of the uterus. Nevertheless, when it is the latter affection, the vaginal portion of the uterus is also affected, being knobbed and uneven, while in diffuse growth of connective tissue in the cervix the vaginal portion is frequently, though not always, normal; or, at least, it is not so diseased as to present the appearance of fibrous carcinoma. In such cases a careful microscopic examination will alone dispel all doubt.

The relations between *induration*, *hypertrophic elongation of the cervix*, and *fibrous carcinoma*, as well as whether the latter may be developed from the former, cannot strictly be determined. Gynecologists assert that it can be developed, and anatomy has no arguments to the contrary. But it is a fact, that diffuse growth of connective tissue, limited to this part, as is the case in carcinoma, may exist for years without the latter being developed from it.

Another proliferation of connective tissue, involving an entire layer of uterine tissue, and complicated with perimetritis, will be considered when we treat of the latter affection.

In opposition to the diffuse growths of connective tissue just described, we place those partial, and more or less circumscribed new formations, generally known by the name of polypi. They are divided according to the uterine stratum in which they are developed: 1st, into polypoid growths of the uterine mucous membrane, with or without degeneration of its glands; 2d, into papillomata, originating chiefly in the vaginal portion, and presenting the character of tumours of connective tissue; and 3d, and lastly, into fibrous polypi, which are developed in the uterine tissue proper.

All these new formations resemble each other in this one particular, that by one portion they are intimately connected with the tissue from which they spring, and consequently cannot be defined from the substance of the uterus.

Two other affections, also classed with polypi, the so-called

fibrinous polypi (Kiwisch) and the placental polypi (C. Braun), will be considered in other chapters.

D. CIRCUMSCRIBED PROLIFERATION OF THE UTERINE MUCOUS MEMBRANE, MUCOUS OR VESICULAR POLYPI.

Literature: Meissner, *Über die Polypen u. s. w.* Leipzig, 1820. — Donné, *Recherches microsc. sur la nature, du mucus etc.* Paris 1837. — Nivet et Blatin, *Sitz und Ursachen der Blasenpolypen* Archiv gén. Octob. 1838, Foripe N. Notiz. Bd. IX. J. 1839. — H. Oldham, *Guy's Hospit. Rep.* April 1844. — Bullen, *Dublin. Journ.* July 1844. — Hugier, *Mem. sur les Cystes de la matrice et sur les cystes follicul. du vag.* Soc. de Chir. Paris, Mai 1847. — Th. Staff. Lee, *On tumors of the ut. and its appendages.* London. 1847. — C. Hirsch, *Histologie und Form der Uteruspolypen.* Diss. inaug. Giessen 1880. — J. H. Bennet, *Pract. treat. on inflammat. of the uterus*, III. edit. London, 1853. — Kiwisch, *kl. Vortr.* Bd. I. pag. 497. — H. Müller, *Verh. d. physik. mediz. Gez. z. Würzburg*, Bd. IV. 1854. — Kölliker und Scanzoni, *Das Secret der Schleimh. der Vagina und des Cervix ut.*, in Scanzoni's Beitr. etc. II. Bd. 1855. — Scanzoni, *Beitrage z. Pathol. d. Gebärm.* Polypen in the same Journal. — Billroth, *Ueber den Bau der Schleimpolypen etc.* Berlin 1855. By the same author. — *Zur Anatomie der Schleimpolypen.* Virchow's Arch. Bd. IX. pag. 302. 1856. — E. Wagner, *Cysten in der Schleimh. d. Uterushöhle.* Archiv f. phys. Heilk. 1855. — By the same author: *Beitr. zur norm. u. path. Anatomie der Vaginalportion*, in the same Journal, 1856. — By the same author: *Beitr. zu den Geschwülsten des Ut.* in the same Journal, 1857. — Leudet und Laboulbène, *Zur Anatom. der follicularem Uteruspolypen.* Gaz. méd. de Paris. 9. 1856. — Scanzoni, *Krankh. d. weibl. Sexualorg.* Wien, pag. 223. — Rokitansky, *Denkschr. d. kais. Acad. d. Wissench.* Bd. I. pag. 328. and *Lehrb. d. path. Anat.* III. pag. 488.

The growths, consisting mainly of connective tissue, which are developed chiefly in the mucous membrane of the uterus, exhibit certain varieties, according as they are developed from the mucous membrane of the body or fundus, or from that of the cervix. They also vary according to their relations to the uterine glands.

First, we meet with growths, arising in the mucous membrane of the body or fundus uteri, in the form of circumscribed elevations, two to three lines thick, and having the shape of flat *plaques*, the surface of the mucous membrane being tume-

fied by catarrh. These puffed elevations are red, shiny, velvety, and smooth; on scraping them with a knife, a milky fluid exudes from them, which, under the microscope, exhibits nothing but the glandular epithelium of the uterus, sometimes transparent vesicles and colloid bodies of varying size (Wedl). Specimens hardened in chromic acid, and thin slices of them treated with glycerine, will exhibit an areolar stroma of connective tissue, with utricular glands partly enlarged and elongated, and partly obliterated. Even with the magnifier, delicate capillary ramifications may be seen, generally uniting in bundles and producing a roughened appearance. The vascularity of these growths is sometimes extraordinary. Sometimes with the naked eye we can see yellow or yellowish-white dots, which, under the microscope, are recognized as obliterated glands, with fatty degeneration of epithelium. In other cases small vesicles are visible in these tumours, resulting from constriction, and cystic degeneration of the utricular glands; this latter forms the transition from these tumours to vesicular polypi of the uterus. These growths of the mucous membrane vary in size, up to an inch or more in diameter.

Many cases present the appearance, especially in the vicinity of the orifices of the oviducts, and along the lateral walls of the uterus, as if the walls of the uterus had become adherent from such outgrowths, and band-like prominent lines of mucous membrane are seen passing from the anterior to the posterior wall. This is evidently the result of an outgrowth of mucous membrane from the angles at which the uterine walls join. Frequently enough we have occasion to observe that adhesions between the uterine walls do take place in consequence of such outgrowths of mucous membrane, especially when they arise from opposed mucous surfaces.

Besides the above-mentioned degeneration of the uterine glands, we find included in these proliferations of mucous membrane the remainder of the glands, elongated, distended, filled with large opaque cells, partly undergoing fatty degene-

ration, and pale, clear, delicate vesicles partly isolated, and partly included in cells.

These vegetations of mucous membrane are frequent, and chiefly result from chronic uterine catarrh, especially in aged females. Pregnancies seem to exert no influence upon them, for I frequently found them in uteri which had never borne children. Owing to their vascularity, these vegetations may give rise to considerable hæmorrhage, and I have preserved the uterus of a woman 36 years of age, who died from anæmia induced by metrorrhagia, in which, after the most careful examination, I was unable to find anything except such a vegetation of mucous membrane about 1 inch thick, and $1\frac{1}{2}$ inch in diameter.

It seems to depend solely on a further condition of the utricular glands, whether from these just mentioned growths from the mucous membrane, more or less prominating tumours described as mucous polypi, will be developed. At first a constriction takes place at the point of limitation between the outgrowth and the mucous membrane, thus rendering the former more prominent; as the proliferation progresses, round, well-defined tumours are formed, varying in size between a bean and hazel-nut, and sometimes having smooth surfaces, and the appearance of villous tumefied mucous membrane. Upon dissecting such tumours, we frequently find in them one or several vesicles, about the size of a hemp-seed, or larger, and filled with serum, or a thick, honey-like substance, which may be either clear or turbid. The surface of larger tumours of this kind are no longer smooth, but covered with small points, corresponding to the transparent vesicles already described. The number of vesicles which these tumours may contain varies; but we may state that the size of the tumour depends upon the number of vesicles within it. A tumour may attain the size of an egg or more, and distend the uterine cavity as it increases. Whilst the tumour at the commencement is shaped according to the uterine cavity, yet, at a later period,

the latter is distended like a globe, and the tumor assumes a spherical shape, unless there are several such, or other tumours present, which, from contact with one another, become flattened, and give the uterus various other forms. The longer these polypi grow, the more distinctly they become pedunculated, and the thickness of the pedicle varies, independently of the size of the tumours.

Sections of these mucous or vesicular polypi show that their framework consists of a delicate connective tissue which exhibits chiefly an alveolar structure. Imbedded in this connective tissue, composed of thin fibres, with a large number of nuclei, we find vesicles with extremely thin walls, and upon the inner surfaces of which, up to the present time, I have been unable to find epithelium. Still, in the contents of many of these vesicles we meet with desquamated cells which may be remains of former glandular cells. H. Müller found in one such tumour, the size of a bean, from the uterus of an old woman, a number of spiral ducts, which, without doubt, must be considered as enlarged utricular glands. In tumours of the size just mentioned I have now and then met with the ducts, but in larger ones they have been searched for in vain.

Rokitansky mentions that the cysts situated at the periphery of the tumours, from time to time rupture, and are replaced by others; sometimes also, at the surface of the mucous polypi, smooth depressions are found, the origin of which may be similarly explained.

These vesicular polypi are generally covered with desquamating, cylindrical or transitory epithelium, or simply with the elements of mucus. The rest of the uterine mucous membrane is affected with chronic catarrh, which we will discuss with derangements of nutrition. The mucous polypi are either single or multiple tumours, and frequently fibroid tumours are simultaneously developed on different portions of the uterine walls.

Mucous polypi are very frequently found in the body of the

uterus, especially in old women, and I must decidedly contradict the experienced Scanzoni in his assertion that they are but rarely developed from the body and fundus uteri.

In regard to other peculiarities of the new-formation I remark, that even when they attain a very considerable size, and greatly distend the uterine cavity, they very rarely pass through the internal orifice into the cervix, or are expelled, as is frequently the case with more solid polypi. The firmness of the cervical walls, the elasticity of those of the uterine body, and the softness of the tumours, seem to explain the cause of the above-mentioned circumstance.

Although in many cases the ramifications and bundles of blood vessels, which are especially noticeable between the vesicles, seem very numerous, yet I must agree with Scanzoni's statement that we never meet with true *telangiectasia*. I have in fact never met with anything approaching such vascular productions. Frequently in the most depending portion of the polypus, a dark-red discoloration exists from imbibition resulting from rupture of the blood vessels in a state of *hypostatic hyperæmia*, and also from extravasation into the parenchyma.

Proceeding to the analogous productions developed from the denser mucous membrane of the cervical canal, at the commencement of their formation, we first find the glands of the above canal degenerating into vesicles situated either in the borders of a single transverse fold of mucous membrane, or when developed parallel on several such folds, arranged into rows, and giving the inner surface of the cervix a peculiar appearance. Or, the degenerated glands are found chiefly along the longitudinal folds, sometimes neatly arranged like a string of beads. One of these small cysts then becomes more prominent, forming a round protuberance, which grows out further and further so as to produce an excrescence, which, in its rounded tumefied portion, contains the gland degenerated into a cyst; or, several such glands prolapse into the cervical

cavity. Lisfranc describes these as *cellulo-vascular polypi*. In the majority of cases a single degenerated gland, or several of them, become so attenuated as to be suspended only by thin pedicles. It is more rare to find larger and broader growths of this kind arising from the degenerated glands of the cervical mucous membrane. Simpson called them polypoid tumours. The vesicular polypi originating in the first-named manner are generally very slender, and the rupture of the vesicles seems to occur at an early period, even before the clubbed tumefied extremity of the polypus has issued from the cervical canal or external orifice. In such a case we frequently meet with long band-like excrescences in the cavity of the cervix, with their lower extremities fimbriated and sometimes distinctly presenting the appearance of the ruptured cavity of the degenerated glands, or the lower extremity of the tumour is flattened and broad like a club, in which case it is quite firm, and it is not improbable that in these instances the prolapsed glands were either obliterated or cicatrized after rupture.

If the external orifice is wide enough, such vesicular polypi, of quite a large size, may pass through it into the vagina and become visible. But, undoubtedly, in many cases the tumefied inferior portion of the polypus has increased in size after it has passed the os. Very frequently the external orifice is narrow, scarcely admitting a large sound, and yet we find a vesicular polypus, the size of a hazel-nut, hanging from quite a thin pedicle into the vagina. Probably in such cases a gland undergoing cystic degeneration has drawn with it a portion of mucous membrane containing several other glands, which, after the thin polypus had passed the external orifice, also degenerated into cysts, and thus caused a disproportionate enlargement of the inferior portion of the polypus. The dependent position of the polypus, and perhaps still more its constriction by the external orifice, and consequent impeded circulation, may be the cause of the subsequent cystic degeneration of the normal cysts, and the rupture of the vesicles formed.

The larger pedunculated mucous polypi developed from the cervical mucous membrane, besides their vesicular elevations, frequently present larger prominences, with deep fissures between, several prolapsed glands or aggregations of glands, being attached to one common stem, which is owing either to a greater stretching of the mucous membrane, or in consequence of the production of more prominences from secondary cystic degeneration of a polypus having but a single clubbed extremity.

Besides the formation of multiple excrescences from glandular polypi, at first single, the pedicle of such single or multiple growths sometimes exhibits a number of small papillary points. This condition is not owing to an exuberation of glands, but to the proliferation of the connective tissue of the polypus itself, from which small prominences arise, which at first are composed of mucous tissue and afterward of dense fibrous connective tissue. This proliferation may become so considerable that the vesicular polypus, after the rupture of its follicles, is changed into a papilloma, resembling an arborescent growth with a number of clubbed extremities. This may have induced Hirsch to make a distinction between areolar and papillary vesicular polypus.

A microscopical examination of the vesicular polypus of the cervix uteri, exhibits a structural condition similar to those which occur in the body of the uterus, with this exception, that the pedicle of the former consists of a denser fibrillary tissue, with a small number of nuclei, similar to that of the sinews.

The consequences of these polypi are the same as of those developed from the mucous membrane of the body; their frequent prolapsing, and constriction by the external orifice, causes frequent hæmorrhages, and thus renders them far more dangerous. This latter circumstance, and the readiness with which they may be detected by vaginal examination, has probably caused the errors of many of the gynecologists, who consider them to be of more frequent occurrence than the mucous

polypi situated higher up, and which, as I have stated, rarely pass the internal orifice. We may concede that cervical mucous polypi are more frequently met with than others, but it would be wrong to say that mucous or vesicular polypi of the uterine body are of rare occurrence. These polypi may also be developed from the vaginal portion, exclusively from its inner lining, and may hang by a pedicle into the vagina. I have seen them in the above region as large as and even larger than a pigeon's egg, and it is only the partial eversion of the cervical canal which sometimes causes the polypi to appear as if attached to the inferior part of the cervix.

Rokitansky describes another kindred new-formation, the result of chronic catarrh and blennorrhœa of the uterus, which presents the external appearance of a soft polypus, but which dissection shows, is connected with the substance of the uterus, like a plug driven into it, and exhibits distinct longitudinal fibres. Rokitansky mentions that this rare growth arises from an elongation of the glandular ducts of the uterus. Oldham must have observed similar cases, for he describes, under the name of "channeled polypi," a movable, slippery, and vascular growth, the interior of which consists of numerous wide ducts, opening in large orifices on the surface of the polypus. He expressly mentions that sometimes these ducts may be followed through the pedicle of the polypus, and also that the latter are direct outgrowths from the elementary tissue of the uterus.

E. PAPILLARY TUMOURS OF THE UTERUS.

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Since Clarke described the cauliflower excrescence of the os uteri (Lisfranc's champignon, végétation fongueuse), the papillary tumours developed from the vaginal portion of the uterus, have generally been comprised under the name of cauliflower excrescences. But a more minute investigation shows that practical gynecology derived no essential benefit from it, the important distinction between benign and malignant tumours being thereby set aside without sufficient cause. Under the form of papillary tumours, there are developed from the vaginal portion of the uterus, not only new-formations of connective tissue and epithelium, but also cancrioid tumours, and a microscopic examination usually enables us to distinguish between them.

We recognize four forms of papillary tumours of the vaginal portion.

As the first, I designate the so-called *acuminated condylo-mata* caused by gonorrhœa. As the second form, the *benign papilloma proper*. As the third, the *cancroid papillary tumour*, Schuh's *granular epithelial cancer*, and Clarke's *cauliflower excrescence*. As the fourth form, the *villous form of medullary carcinoma*. The two latter forms will be described in a subsequent chapter.

Microscopically, the first two forms are near alike. The papillæ of the mucous membrane of the vaginal portion proliferate, either singly or arborescently, and we find either delicate papillæ terminating in fine points, and covered with a layer of epithelium, or their extremities are tumefied similar to a club. In these papillary outgrowths we always find a blood vessel, sometimes of considerable size, which is either

single, or forms a ramification of large capillaries distributed in a manner similar to that of the intestinal villi. The connective tissue is either of recent formation, or dense, and composed of thin fibres; the epithelium of the innermost layer is similar to the *rete Malpighi*; in the outer layer we find basement epithelium, with flaky cells frequently without nuclei.

In so-called acuminated condyloma a considerable portion of the substance of the vaginal portion is affected, and frequently, also, the vagina and external genitals. From the mucous membrane sharp-pointed papillary excrescences are seen arising, either isolated or in groups, in which latter case they may give a delicate villous appearance to the part. These vegetations are soft and rose-colored. At a later period the dividing branches and their extremities become clubbed, and assume the form of a raspberry, coxcomb or cauliflower, with a broad pedicle, and are covered with an abundance of epithelium, which gives them externally the appearance of a smooth mass, the epithelial layers passing over the fissures and insections of the papillary tumors. Such excrescences of long date often acquire considerable firmness, which condition may lead an inexperienced observer to mistake them for other tumours. After removing the external epithelial layers, the wart-like surface of the tumour is easily recognized, and when separating the former you will find deep fissures between the densely crowded papillæ. Acuminated condylomata, although not frequently found in the vaginal portion, are nevertheless those which seem to be the most frequent form of papillary tumours. Leucorrhœa always coexists with the latter.

True papilloma is seldom found in the vaginal portion and is in no respect different from acuminated condylomata grouped together in the form of a polypus. But in general we may state that acuminated condylomata are generally numerous and scattered over the mucous membrane of the vaginal portion, sometimes in hundreds, whilst benign papil-

loma generally occurs as a solitary tumour and is not always combined with blennorrhœa, as is always the case with condyloma. In many cases these papillary tumours consist of a framework of caudate elongated cells with large oblong nuclei, covered with the usual basement epithelium. It has, however, been conclusively demonstrated, that these simple papillary tumours, after existing for a certain time, may assume a cancrioid character, and many class them with cancrioids; still, cases are known in which these growths existed for years without changing their benign character, and this fact has induced me to make a distinction between simple papilloma and papillary cancrioid.

Acuminated condylomata, as well as simple papillomata, may spontaneously become gangrenous, which may be caused by the stagnation of circulation resulting from their dependent position; or traction of the pedicle may cause mortification or sloughing of the tumor. Acuminated condylomata may also disappear spontaneously, in consequence of a retrogressive metamorphosis induced probably by obliteration of their blood vessels.

From the various ulcerations of the os uteri, granulations, simulating the form of papillary growths, sometimes arise, a description of which we will give when treating of the ulcerative processes; for they constitute no permanent new-formation or independent morbid form.

F. FIBROUS POLYPUS, OR SARCOMA OF THE UTERUS.

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The fibrous polypus of the uterus consists of a well circumscribed hyperplasia of the uterine substance, especially of its connective and submucous tissue, to which latter it is analogous in structure.

It generally commences as a round submucous elevation, growing toward the cavity of the uterus in the shape of a round tumour, being covered by the uterine mucous membrane which at first is unaltered. As these new-formations increase in size, they project more and more from the uterine substance, become pedunculated, and are suspended with their largest portion in the distended cavity of the uterus. Their form is generally round or nearly round, sometimes pear-shaped, clubby or cylindrical; frequently their longitudinal diameter exceeds the transverse. They are either single, or in rare cases divided into lobes by deep fissures.

The solidity of fibrous polypi varies, according to their age, and the stage of development of the new-formation, between a soft and doughy elasticity, and a firmness nearly cartilaginous. Their color varies according to their supply of blood and vascularity. Fibrous polypi, as a rule, are quite vascular, especially when compared with the uterine fibroid tumours which are similar to them in structure. On dissecting fibrous polypi we perceive that they are developed from a portion of uterine tissue which has increased in density, and that they are intimately connected with it; that they are not well defined at their point of insertion into the uterine tissue, and consequently cannot be enucleated. When they extend into the cavity of the uterus they are always covered by its mucous membrane, but the latter frequently undergoes important changes. At first it is generally affected with catarrh, afterward it is thinned, and numerous small indentations, varying in size between a needle-point and pin-head, indicate the destruction of the utricular glands. Finally, the mucous membrane is evidently destroyed, and is represented by a large-meshed net-work (Rokitansky), the interstices of which correspond with the dilated and flattened glandular spaces. In other cases the proliferation of the mucous membrane assumes the form of a villous vascular spongy membrane, even in the covering of larger polypi, and in such cases we frequently find small cysts, as large as a hemp-seed, which have resulted in consequence of distention of constricted utricular glands.

The structure of the polypi mentioned, consists essentially of connective tissue in various stages of development, in consequence of which the appearance of a polypus varies. If the substance of the tumour is chiefly composed of newly-formed connective tissue, a section of it is soft and presents a homogeneous appearance, is of a grayish-red color, traversed in various directions by white lines, which generally diverge from the pedicle of the tumour into its substance. If, however, the substance of the tumour consists of connective tissue

of older date, fibrous bundles will be observed crossing each other in different directions; in rare cases they assume a concentric disposition around a more solid nucleus. A closer examination of these tumours will show that they are generally composed of a wavy connective tissue with an abundance of nuclei; sometimes they contain caudate cells, of considerable length, united in thick bundles and crossing in various directions. Thin sections treated with acetic acid bring distinctly into view their long massive nuclei.

In many instances the structure of these uterine polypi is not so simple. The utricular glands having become elongated, constricted, and afterward degenerating into cysts, enter into the composition of these tumours and give them the character of Rokitansky's *adenoid uterine sarcoma*, and adenoid uterine *cystosarcoma*. In the following lines I copy from the masterly description of the discoverer of these tumours. "In the substance of the sarcoma, consisting of straight-fibred connective tissue, small excavations, scarcely perceptible, and larger ones, circular, ragged and fissured, are frequently found grouped together. They are either filled with a clear yellowish liquid, or some may contain a small quantity of blood, as I observe in the specimen before me. Upon a closer examination with the microscope we perceive that these cavities possess no lining membrane, excepting a scarcely perceptible hyaline border, but now and then we meet with some, filled with epithelial cells, and having all the appearance of transected ducts." The surface of the tumour next to the mucous membrane, is usually closely adherent to the latter; and in close apposition to the spongy stratum representing the mucous membrane we meet with the outermost succulent layer of the new-formation, which appears covered with numerous small excavations. In the degenerated uterine mucous membrane which covers this new-formation, the elongated, constricted, and cystoid utricular glands are found, a continuation of which is apparent in the excavations of the

spongy external layers of the new-formation. Consequently, the utricular glands have not only degenerated into ducts in proportion to the increase of thickness of the mucous membrane, but they have also grown into the submucous stratum in which the tumour was developed, and at the same time have undergone degeneration. Those excavations, however, found in the deeper layers of the tumour distant from its mucous membrane, mostly originate from adenoid degeneration of the fibrous polypus, and must be considered as new-formations of glandular tissue.

Upon section of such tumours we frequently find tuberous bodies imbedded in them, and a careful investigation proves without doubt, that from the walls of the several cavities analogous to the *adenoid cystosarcoma* of the breasts, proliferations of connective tissue grew out of the mass of the tumour, filling the round cavity in the form of tuberous or round papillary excrescences, in the substance of which new cavities may be formed with further proliferations from their walls. These tuberous masses growing into these cystic cavities may apparently be completely enucleable, still it is easy to convince oneself that at one point they are firmly adherent to the wall of the cavity and form a continuous body with the substance of the whole tumour.

The formation of cysts in fibrous polypi has already been described by Hope. Rokitansky states that it is not improbable that similar cavities may be formed in some fibrous tumours growing toward the peritoneal surface of the uterus, causing them to degenerate into adenoid cystosarcoma.

The larger cystic cavities of the tumours described, are either filled with serum or colloid fluid, mucus and blood, and may in isolated cases, after inflammation, contain pus and present the characteristics of an abscess.

The blood-vessels of the fibrous polypus are very numerous, and the calibre of the veins especially, is remarkable. The latter frequently represent sinuous canals (Rokitansky).

The *fibrous*, as well as the *adenoid* polypus is rarely met with before the 20th year; still, isolated cases are mentioned of their occurrence in children (Pfaff). After the 30th year they are of rare occurrence.

The size of these polypi varies from the almost imperceptible to the size of a child's head, and even larger. Their most frequent size is that between an egg and a man's fist.

They most frequently arise from the fundus uteri and the superior portions of the uterine wall (internally), and, as before mentioned, from the submucous stratum; in very rare instances they are more deeply attached in the parenchyma of the uterus, and in such cases they sometimes grow outwardly and form tumours inserted at the fundus and hanging into the peritoneal cavity. Rokitansky mentions, that sometimes portions of polypi branch off in such a manner as to form tumours, which will cause prominences on the exterior of the uterus. The fibrous polypi which grow toward the peritoneal cavity, may also be attached by a thin pedicle, may be single or lobular, and may attain an exceedingly large size (Rokitansky). In many cases fibrous polypi have been found depending from the cervix uteri, or, which is more rare, from the vaginal portion of the uterus. In the majority of cases only a single polypus is found, sometimes, however, two are seen, flattened from contact, but rarely more than two. Sometimes we find adjoining a large polypus evidences of smaller ones, consisting of submucous round elevations. When fibroid polypi are present, the uterus is generally hypertrophied, and its substance in a condition similar to that of a pregnant one (Kiwisch), being succulent and spongy, and its veins distended. Frequently the uterus is found to be affected with profuse proliferation of connective tissue. The condition of its mucous membrane has already been particularly described.

After a fibrous polypus has attained a certain size, the uterus manifests a tendency to get rid of it by contracting. This is undoubtedly caused by the downward growth of the tumour,

which, after the uterus has been considerably distended, produces effects analogous to those of labor; the cervical canal shortens, the internal orifice becomes fully dilated, causing the cavity of the cervix to communicate with that of the uterus; the vaginal portion becomes elongated, and after the passage of the broadest portion of the polypus through the external orifice, an energetic contraction of the uterus expels it into the vagina, or in other words the polypus "is born." In many cases the polypus, after a portion of it has passed the external orifice, is constricted, and thereby divided into a superior and inferior portion. If the pedicle is thin and elastic, the uterus may still retain its normal position, but if such is not the case, partial or even complete inversion of the uterus may occur. The latter accident is most likely to happen when the polypus is inserted at the fundus or superior portion of the body of the uterus, but even when attached lower down it may cause partial inversion, and in this respect Ulrich's case, previously mentioned, is interesting.

The metamorphoses which the structure of the fibrous uterine polypus undergoes are: cystic degenerations which constitute cystosarcoma, and fatty degeneration. In the latter condition the polypus becomes of a doughy consistence, and its tissue abounds in fine granular fatty elements, which on section appear as a pale yellowish net-work. Less frequently we meet with gangrene of these polypi, which sometimes arises in larger tumours of this kind which have prolapsed, and is probably owing to stagnation of their circulation, in consequence of considerable traction or twisting of the pedicle. Gangrene generally first affects the lowest portion of the lining mucous membrane of the polypus, and thence extends to its substance, giving this portion of the tumour a jagged appearance. Under these circumstances, even sloughing of the whole polypus may take place, (Marchal de Calvi), and the ichorous process may extend to the mucous membrane, and even to the substance of the uterus. In rare cases such ichorous processes may

lead to perforation into a neighboring cavity, i. e., the bladder or abdominal cavity, or externally through the abdominal parietes (Rokitansky and Loir), and may also occasion thromboses, ichoræmia, lymphangitis, &c. Ossification and calcareous degeneration never occur in fibrous polypi.

Large polypi may act injuriously by pressure upon the canals which pass through the pelvis, causing distention of the ureters, hydronephrosis, œdema of the lower extremities, varicose condition or even thrombosis of the crural veins and compression of the rectum. The mucous membrane covering the most dependent portion of the polypus is often the seat of hyperæmia and even hæmorrhage, which latter may prove fatal.

Sometimes destructive ulceration commences in the uterine mucous membrane, ultimately involving and destroying the pedicle of the polypus. Excessive traction may also cause spontaneous rupture of the thin pedicle of a fibrous polypus.

On the other hand, adhesions may occur between the degenerated mucous membrane covering the polypus and the lining of the uterus, causing obliteration of the cavity of the latter. If the lower portion of the polypus becomes adherent to the internal orifice or cervix, hydrometra may result. Cases have also been observed in which a polypus prolapsed from the uterus into the vagina and became adherent to the walls of the latter by the formation of false membranes.

If some authors have stated that a fibrous polypus may be attached to the walls of the uterus by two pedicles, one of the latter has originated either from an adhesion of the polypus to a second point of the uterine wall, or is formed in consequence of the coalescence of two previously single polypi.

The condition of fibrous uterine polypi during menstruation and pregnancy, is also interesting. Their tissue tumefies in the same manner as that of the uterus, it becomes softer, more succulent, vascular, and sometimes considerably engorged. At the termination of the above processes involution ensues.

The presence of fibrous polypi generally causes derangements of menstruation, and if conception takes place a polypus may injure the foetus by limiting the uterine space. Among the frequent complications we must also include blennorrhœa of the uterus, fibroid tumours, dropsy of the oviducts, and perimetritis.

G. ROUND FIBROID TUMOURS OF THE UTERUS.

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The round fibroid tumour of the uterus is a growth consisting chiefly of connective tissue, is always round, more or

less dense, of well-defined outline, and easily enucleable from the surrounding tissue; it is also the most frequent of those tumours which affect the uterus, and although naturally benign, may easily terminate fatally, either from pressure upon the neighboring parts, or other accidents. It certainly constitutes the most frequent affection to which the female sexual apparatus is subject, after puberty.

Various names were given to these growths by the old writers: Tuberculum (Morgagni), Cellulo-fibrous bodies (Bayle), Steatoma (Voigtel), Sarcoma, desmoid, and fibrous tumours, &c.

At present we recognize the existence of two forms of fibroid tumours, which are best distinguished as the simple and compound.

The simple round fibroid tumour is developed from a limited portion of the uterine connective tissue, and grows by an independent proliferation of its elements, simply by displacing the surrounding tissue and thus completely defining itself from the rest of the uterine substance. It generally forms a spherical whitish or reddish-white tumour, and usually of such firmness that considerable force is necessary in dividing it with a knife. It is generally readily enucleated from the tissue of the uterus; if a division is made through both tumour and uterus, the former rises above the divided surface of the latter in consequence of a retraction of the uterine substance. The attachment of the tumour is merely by a slightly vascular and slender bundle of connective tissue; its surface, after it has been enucleated, is perfectly smooth and covered with a serous-like membrane; the cavity in which it was imbedded is also smooth and shows no trace of any rupture of tissue. The section of a simple round fibroid tumour generally exhibits dense interwoven lines of fibres crossing in various directions, and irregularly disposed; and those cases are exceedingly rare in which, on the divided surface, a somewhat dense yellowish nucleus is seen, and around it a concentric disposition of

fibrous lines. Here and there, in the outermost of the above fibres, short arch-like striated lines may be seen, marking the periphery of the tumour.

As a second form, we may consider the compound fibroid tumour, which consists, chiefly, of a larger or smaller number of fibroids of unequal size, which are flattened by contact and united into a single mass by loose connective tissue. In structure the compound fibroid tumour is not different from the simple ones, only its component tumours are less dense in structure, more succulent and vascular, and their limits not sufficiently well defined to allow of their easy enucleation. Kiwisch remarks that whilst in the simple fibroid tumour the fibrous lines are more or less regularly disposed around one centre, in the compound tumour several such centres exist, from which fibres of connective tissue ramify; and this is undoubtedly correct. Still, I must add, that in the majority of cases the bundles of connective tissue arising from the central point are intimately interwoven with others coming from a different direction, and that between the different prominences of the tumour a loose connective tissue exists, composed of long fibres, which forms a kind of external envelope by which the whole mass is imbedded in the uterine tissue. The surface of such tumours is knobbed, lobulated, and irregular; frequently small newly-formed fibroid bodies, the size of pellets, are seen in the loose external covering, especially between two or more lobes of the tumour. These compound fibroid tumours seem to possess a kind of *hilus*, large veins apparently issuing from the tumour, opposite to which hilus the uterine substance is completely transformed into a cavernous tissue. The arteries are scarcely perceptible, whilst the veins form a considerable plexus. If you follow the course of the latter over the tumour, it is easy to perceive that they represent large sinuous canals, which extend longitudinally between the lobes of the tumour, receiving small ramifications which converge from the periphery of the

single lobes. Abernethy could never succeed in injecting the separate lobes of a compound fibroid tumour. Dupuytren makes express mention of large arteries in the pedicles of fibroid tumours which protruded inwardly; and Caillard describes such an artery which was the size of the radial. In my own investigations I was unable to find such an artery, even in large tumours. Once only I met with one, the size of a uterine artery, in the hilus of a compound tumour as large as a man's head.

The number of capillaries varies in different fibroid tumours; successful injections have shown a surprising number, in contrast with the habitual paleness of these tumours.

Here it is proper to mention what Virchow has described as a *telangiectatic muscular tumour* (*Myoma telangiectodes*):

“The inferior portion of a large fibroid tumour exhibited in its engorged tissue, isolated cavernous growths commencing as dense sieve-like tissue and gradually developing into large cavities, varying between the size of a pea and hemp-seed. The walls between these cavities were of the thinness of those found in cavernous tumours of the liver, and consisted chiefly of smooth muscular fibres.” (Virchow, *Archiv.* vol. VI., p. 553, 1854).

Virchow frequently found indications of such productions in the larger fibroid tumours of the uterus, but rarely so apparent as in the case quoted literally above. I have likewise met with several cases in which this production was slightly apparent, and recently with a case in which it was considerable.

Uterine fibroid tumours vary from an almost imperceptible size to that of a man's head, or even larger. Cases are recorded of these tumors attaining the weight of 14 pounds (Brinz); Dupuytren saw one of 25 pounds; Gaultier de Claubry, one of 3 pounds; Voigtel mentions the cases of Reisel, Mören, Pelargi, and others, in which the tumours weighed from 40 to 60 pounds.

The seat of fibroid tumours is almost exclusively in the body and fundus uteri. They are very rarely found in the cervix, and more rarely still in the vaginal portion. The progress of these tumours, according to their situation, is of interest. We find them arising in the different strata of uterine tissue, and the direction in which they finally project or prolapse, depends upon the situation of their point of origin. A tumour developed from the centre of the uterine wall, grows uniformly, and projects toward the uterine cavity, as well as outwardly, the latter prominence always being the most considerable. If a fibroid tumour has been developed exactly in the centre of the substance of the fundus, and grows to a considerable size, the uterus in consequence of the external protuberance of this tumour assumes a form similar to that in pregnancy, from which circumstance these two conditions may be confounded, as has occurred in many instances known to me. In consequence of the tumour causing an inward prominence of the fundus, which is always combined with elevation of the whole uterus, the cavity of the latter is increased in breadth, and its superior wall is depressed and becomes convex. The uterus undergoes a similar change in form when the tumour grows from a point situated in the median line of the body, in the superior portion near the fundus. When the tumour is developed nearer to the peritoneal surface of the uterus, it projects more toward the abdominal cavity, and grows out of the uterus in such a manner that its attachment at first becomes constricted and neck-like, and afterward is converted into a pedicle, which may be very thin.

Rokitansky states that such pedunculated tumours may even be detached from the uterus, and float about in the peritoneal cavity, especially in the recto-vaginal space; or, peritonitis may supervene, causing the formation of false membranes, which will render them immovable. Detachment of the tumour may be caused by its weight stretching and rupturing

the thin pedicle, or by contraction of the false membranes attached to the tumour. If a fibroid tumour has been developed near the mucous membrane of the uterus, or its sub-mucous tissue, as is frequently the case, it grows toward and into the uterine cavity, and at the same time distends it. Gradually the tumour issues from the uterine substance, being attached by a pedicle covered with a thin mucous membrane. When they prolapse into the cavity of the uterus, such tumours produce phenomena similar to those resulting from fibrous polypi. When developed near the point of insertion of the broad ligament, the tumour will ultimately grow between both the laminæ of the ligament; if it arises at a higher point in the lateral margin of the uterus, the oviduct, to which it becomes closely attached, arches over it, and is consequently displaced; if the tumour arises lower down, it causes no alterations in the form of the uterus, excepting a prominence on both sides of the broad ligament. A close inspection of a fibroid tumour arising apparently in the broad ligament, will always lead to the discovery of a pedicle attached to the uterus, and consequently will enable a correct opinion to be formed as to the point of its origin. A fibroid tumour, when developed within the broad ligament, generally projects uniformly anteriorly and posteriorly; sometimes, however, it may protuberate to one side only, either to the posterior or anterior, and cases may occur in which such a tumour may become pedunculated and prolapse into the recto- or vesico-uterine space. I came into possession of a specimen a year since, in which a prolapsed fibrous tumour, the size of a walnut, with a thin pedicle, projects at the point of insertion of the left broad ligament, into the vesico-uterine space.

If a fibroid tumour is developed from the lateral margin of the cervix and grows out of the uterus, it causes the posterior laminæ of the broad ligament to prominate posteriorly and markedly pushes the uterus in an opposite direction. If the tumour is situated laterally and low down, it causes obliquity

of the uterus, the fundus of the latter being directed toward the side on which the tumour is situated.

Fibroid tumours arising in the vaginal portion of the uterus cause considerable tumefaction of the latter, and grow into and distend the vagina. An entire lip of the os may also be involved, presenting the appearance of a large pedunculated fibroid tumour, instead of the os uteri.

The alteration of form and position of the uterus, occasioned by a fibroid tumour, depends upon the point of origin of the latter. As previously mentioned, such tumours developed in the median line of the uterus cause uniform enlargement of the organ, similar to that occasioned by pregnancy. If the fibroid tumour arises in the median line of the posterior wall, the uterus gradually ascends from the pelvic cavity, its own cavity becomes elongated, and its posterior wall convex, and a section of it presents a crescentic appearance. The uterus proper is situated at the anterior circumference of the whole mass. An opposite condition is found if the tumour originates in the median line of the anterior wall. The traction to which the uterus is subjected in both cases may become excessive and produce those alterations of position which have been described as *elevation of the uterus*; the vaginal portion and vagina become elongated, and the effects of the traction within the uterus are most marked in the region of the internal orifice, at which point a stricture of its cavity and thinning of its walls, may cause obliteration of the former and expansion of the latter.

When a fibroid tumour grows from either side of the body, or from the fundus of the uterus, after attaining a certain size it pushes the latter to the opposite side. If the tumour is at the same time an interstitial one, it projects into the uterine cavity, and a transverse section of the organ presents a triangular appearance. If a tumour grows lower down, near or at the internal orifice, the entire uterus is in consequence pushed into an extra-median position, or is flexed laterally, with its fundus inclining toward the tumour. This *latero-flexion* is

frequently only revealed on opening the cavity of the uterus, and is much more marked, the nearer the tumour lies to the mucous membrane and the internal orifice. When a fibroid tumour is developed in the side of the cervical portion, which is of rare occurrence, after attaining a certain size it will cause obliquity of the uterus, with inclination of its fundus toward the tumour.

If several fibroid tumours have been developed in the uterus, their individual effects upon its form and size are combined. The uterus often appears imbedded in a mass of tumours, and from its external appearance we can form no idea of the course of its cavity. It may be found in the lateral, anterior, or (rarely) posterior periphery of the mass; or, if the cavity passes through the centre, its shape is much altered by the tumours projecting into it. In some places it may be contracted, or there may be a dilatation above a point of stricture; or it may be elongated, narrowed, and curved like a bow or the letter S; or it may pass around the periphery of one or more of the tumours; or, in some cases, it may even be flexed at an angle. Manifold and varied are likewise the alterations of form to which the cavity of the uterus is subject from tumours projecting into it at different points.

In regard to the microscopical anatomy of uterine fibroid tumours, we must first state that their structure is quite analogous to that of the uterus, the proportion only of the several tissues constituting the latter being altered in these tumours. In the majority of cases the connective tissue predominates; but we frequently meet with fibroids, in which the smooth muscular fibres exceed the rest of the tissue (hence the name of *fibro-muscular* tumour and *myoma*); and it may generally be considered a rule, that the quantity of muscular fibres entering into the structure of a fibroid tumour is nearly in proportion to that of its succulence.

Thin slices made with a double-bladed knife, or with a razor, after being rendered transparent, show that the connective

tissue of uterine fibroid tumours is frequently composed of broad, wavy fibres, crossing each other in various directions, and causing a small section to appear divided in various ways by fibres of connective tissue. The cells of the above tissue, few in number, are spindle-shaped, and rather small, with oblong nuclei, and distinct nucleoli. Stellate cells and spiral fibres of connective tissue (Förster) I have not met with hitherto in fibroid tumours. The fibres of connective tissue are united in bundles of varying thickness, from which smaller ones branch off and unite with others. If these lines or fibres are divided parallel to their course, they present the appearance of whitish glossy lines, whilst those divided transversely appear grayish, which fact formerly led to the assumption that fibroid tumours consisted of white connective tissue, disposed in fibrous lines or bundles, the intervening spaces being filled with a grayish substance. Förster remarks, that soft fibroid tumours, of recent formation, contain more cellular elements, which may be transformed into fibrous lines and connective tissue. This is the explanation given of the aggregation of nuclei, sometimes met with in these tumours, and I remember several cases in which tumours resembling fibroids, but somewhat softer, consisted chiefly of large oval, densely-crowded nuclei, in a homogeneous, partly striated, intercellular substance, which tumours I could not consider otherwise than fibroids at an early stage of development.

In the majority of instances in which fibroid tumours exist, the uterus is uniformly enlarged by an increase of its substance, either in consequence of general hyperplasia, or diffuse proliferation of connective tissue. Frequently, however, this increase in substance is irregular; isolated portions of the uterine walls being affected with proliferation of their elementary tissues, whilst other portions are unaffected or participate so slightly in the morbid process that the latter is scarcely noticeable. The increase of the uterus in substance during the presence

of fibroid tumours, is especially evident when the latter are developed within the tissue of its walls. When the tumours are situated more externally, or project from a pedicle into the peritoneal cavity, the increase of the uterus is much slighter. Lastly, when fibroid tumours grow into and dilate the cavity of the uterus, its substance may even be diminished, in consequence of the distention of its walls. In such cases the latter sometimes become membranous and reduced to the thickness of one or two lines; but if, in such cases, a considerable blennorrhœa of the uterine mucous membrane coexists, the uterine tissue becomes the seat of diffuse proliferation of connective tissue.

The enlargement of the uterus from fibroid tumours, is most frequent in young females, whilst in old women it is generally found in a state of senile atrophy. In these latter cases the congestion occasioned by the presence of the tumour is insufficient to counterbalance the wasting from old age. In many cases atrophy of the uterine substance attains such a degree that the walls of the organ become membranous (Walter's Membranous Uterus). Especially when compound fibroid tumours attain a considerable size, the walls of the uterus may become so thin that the separate tumours may be seen and felt through them. In contradiction to the observation that the increase of the uterine substance is always most considerable in the immediate vicinity of the fibroid tumour, we must mention those cases of compound tumours in which, in the region of the hilus, the uterine parenchyma appears as if absorbed by the presence of large-sized veins.

The changes which we notice in fibroid tumours of the uterus, are partly owing to altered conditions of the latter, and partly to the different stages of development of the tumour; or they may result from morbid processes affecting the tumour primarily or secondarily.

It is necessary to state that the round fibroid tumour participates in all the changes to which the uterus is subject during

menstruation and pregnancy, and this is especially the case when its tissue is analogous to that of the uterus. During menstruation we find the tumour enlarged and more succulent, and during pregnancy also, the above changes take place. Fibroid tumours found in women who have died during the puerperal state, are peculiar for their flaccidity and softness of tissue. It is reasonable to suppose that these tumours undergo an involution after the puerperal state, analogous to that described by Heschl as occurring in the uterine tissue. The observations which I have been able to make in regard to this statement, although not entirely convincing, have in no way led me to infer the contrary.

Fibroid tumours of the uterus are subject to certain diseases arising in their own structure, or developed in their vicinity by their presence, and ultimately involving the tumour itself.

In the first place, it must be mentioned that, in the neighborhood of fibroid tumours which prolapse into the cavity of the uterus, an inflammatory process in the bed of the tumour is often developed, beginning generally at the most dependent portion of its mucous membrane, by *hypostatic hyperæmia*, and leading to the formation of pus or ichor, in consequence of which the tumour is detached and expelled, either entire or piecemeal, by labor-like contractions of the uterus. Thus metritis may ensue, which, resulting in the formation of pus or ichor, may ultimately prove fatal from the supervention of pyæmia. A patient may recover after the expulsion of a fibroid tumour in the above manner.

It rarely happens that the whole tumour is enucleated from the wall of the uterus by a purulent process at its circumference; such a process is generally accompanied with intense lymphangitis. But whether the tumour is detached from the uterus by an ichorous or simply purulent process, it is always in a flabby condition, collapsed, and œdematous. In very rare cases small purulent cavities are also found in the substance of the tumour. Rokitansky mentions a case in which a purulent

sac, the size of an egg, developed in a pedunculated tumour, became adherent to the rectum and perforated it at three points.

When the mucous membrane of the most dependent portion of a pedunculated fibroid tumour becomes gangrenous, the gangrene may extend to the tumour itself without detaching it; but it will, however, gradually slough away. Another manner in which a fibroid tumour projecting into the uterine cavity may be detached, is by *destruction* of its pedicle, consisting of mucous membrane and uterine tissue, by gangrene, in consequence of which the tumour lies detached in the cavity of the uterus, and from which it is ultimately expelled by uterine contractions; or, it may become detached by *rupture* of its pedicle, which has become elongated by the growth and descent of the tumour.

A fibroid tumour may become œdematous (Cruveilhier), and this often arises without known causes, and becomes considerable, especially in the compound tumours. When the latter are thus affected they suddenly increase in size, and represent fluctuating, tuberos and irregular tumours, resembling cystoid tumours of the ovaries. Upon section, we frequently find the succulent connective tissue between the separate tumours of the whole mass, extraordinarily œdematous, and infiltrated with a pale yellow or greenish fluid. Each single tumour is separated from the others by a firm white substance, which gives a peculiar appearance to the whole mass. The more compact, round, and simple fibroid tumours are rarely affected with œdema, and when so affected, are not visibly altered by it.

Kiwisch repeatedly noticed, especially at the menstrual period, or previous to a hæmorrhage, an exceedingly sudden increase of these tumours in volume, in consequence of which their circumference was increased in the space of a few hours nearly half an inch, and again decreased with the same suddenness.

Within some fibroid tumours cavities may be found, which may have occurred in several ways. They either result from a dropsical condition; or the connective tissue of the tumour undergoes *colloid* metamorphosis (mucous degeneration), commencing at the centre of the tumour, and in consequence of which its substance liquifies into an albumino-serous fluid. Finally, hæmorrhages into the substance of a tumour may lead to the formation of cavities similar to the so-called apoplectic cysts. The cavities found in the centre of fibroid tumours, are generally round and smooth-walled, and are often so large that their walls are comparatively thin, and assume the characteristics of a fluctuating tumour, on which account they may be mistaken for hydrometra, hæmatometra, pregnancy, or ovarian cysts. The inner layers of the walls of such cavities are generally in a state of fatty degeneration. If the cavities, however, are situated eccentrically, their origin, from the separation of the concentric layers of the tumours, is evident from their concavo-convex shape. The latter cavities, I am inclined to think, frequently arise primarily from hæmorrhage, for we generally find evidences within them of extravasation, in the form of rusty-brown deposits, or rusty-brown pigmentous discoloration of the innermost layers of their walls. When the circumference of a fibroid tumour has been affected with ulcerative inflammation, collections of pus are frequently found in the peripheric cavities formed by the ulcerative process mentioned. Generally the contents of the various cavities in fibroid tumours, are a clear watery, yellow or brown, sometimes turbid and chocolate-colored serum; or a viscid fluid; or finally a gelatinous mass. In many of the cavities, especially small ones, the contents are found to be fresh blood.

Wedl sometimes found in them imperfectly-defined spots, with indented elongations, occurring singly, and unconnected with the blood vessels, which he supposed to be recently effused blood. I have never met with such a condition, and, therefore, simply quote Wedl's observations. Possibly in

these he may have met with productions resembling those described by Virchow and myself as *telangiectatic myoma*, the connection of which with the blood vessels can easily be demonstrated.

From what has been demonstrated, we conclude that fibroid tumours may be affected with hæmorrhage; still, considering the firmness of the tissue of such tumours in an advanced stage of development, and their relatively small number of blood vessels, we must assume that hæmorrhages in such tumours will only occur when they are of recent growth, and consequently softer; or, when the tissue of older and more compact tumours has been altered by œdema, hæmorrhage might possibly take place into a cavity within them. The probability of the former assumption is rendered possible by the fact, that hæmorrhages in fibroid tumours rarely occur excepting during menstruation and pregnancy. We may also mention the possibility of hæmorrhage from the presence of *telangiectatic myoma*, and it is not improbable that, in consequence of the retrogressive metamorphosis of such an extravasation, the affection causing it may no longer be recognizable. The extravasation is generally slight, and the extravasated blood generally undergoes the changes usually found in apoplectic cysts. Sometimes several such effusions are met with in one fibroid tumour, and I have never found them in tumours smaller than walnuts. Owing to the greater vascularity of compound fibroid tumours, extravasations are of more frequent occurrence in them.

In a woman who had fallen from a considerable height, I discovered a fracture of the pelvis, and an extravasation of blood between a fibroid tumour the size of an egg and the wall of the uterus; half of the periphery of the tumour was surrounded by a thin layer of extravasated blood, by which one-half of it had been detached. In scorbutic and analogous conditions of the system, however, I have never met with such hæmorrhages.

The retrogressive metamorphosis, to which fibroid tumours

are subject, are *fatty* and *calcareous degeneration*. In fatty degeneration, chiefly the muscular portions of the tumour are affected, and we often find them transformed into fatty granular cells. Besides this, fat is always found in large or small drops. The cells of the connective tissue undergo a similar metamorphosis. The external appearance of a fibroid tumour undergoing fatty degeneration is altered; it becomes flabby, doughy, and soft; pits on pressure, and is very friable; its color changes to pale yellow or faded brown; on section, its structure appears uniform, it having lost its fibrous character. We frequently meet, in combination with this fatty degeneration, a considerable deposit of a fine granular brown or yellow molecular substance, and granular calcareous salts.

Fatty degeneration of a uterine fibroid tumour frequently originates in the above manner during the puerperal state. Sometimes it occurs after the change of life, probably from *senile involution*, and a tumour undergoing such metamorphosis may thereby be diminished in size. At any rate, at the inception of fatty degeneration, any further increase of the tumour is arrested.

The second metamorphosis, which not unfrequently affects old fibroid tumours of the uterus, is calcareous degeneration or *ossification*. Dupuytren mentioned that the transformation of uterine fibroids, usually termed ossification, properly speaking is only a process of petrification. While fatty degeneration chiefly affects the muscular substance of the uterus, a deposit of calcareous salts generally takes place in the connective tissue of the fibroid tumour. The results of this metamorphosis are various. The calcareous salts either cohere in an amorphous mass, devoid of organization, or in thin segments of it we find transitions from calcareous degeneration to ossification. The intercellular substance appears, either as an aggregate of large or small round bodies; or it is uniform, striated here and there; or it exhibits a laminated structure around large

ducts. In the intercellular substance we find irregular angular black, solid, or hollow masses, consisting of pigment and fine granular matter, which fill the small spaces of the intercellular substance (Wedl), and must be considered as deformed rudiments of medullary canals. Besides these masses, we sometimes find degenerated or imperfectly formed bone-corpuscles of extraordinary size, but with few and short radiations. Sometimes, however, in isolated portions of such degenerated fibroid tumours, distinguished by their compactness and smoothness, we find bone substance, perfectly similar to normal bone, and generally with very large medullary spaces. The formation of such normal bone substance in calcified uterine fibroid tumours was first observed by Wedl.

Calcareous degeneration of uterine fibroid tumours commences either at their periphery; or isolated centres are developed dispersely in various portions of the tumour, without originating from its centre, which is of course, its oldest portion. In the former case, flat concavo-convex shells are formed, which finally coalesce, and may form a kind of osseous covering to the tumour, from which irregular processes sometimes radiate inwardly toward the centre of the mass. Frequently, especially in nodulated compound fibroid tumours, isolated portions are calcified, whilst the remaining substance is unaffected, or in a state of fatty degeneration. Although a fibroid tumour may appear to be calcified throughout, yet, literally, such is rarely the case. Sometimes we find imbedded in the substance of the uterus, round, whitish, heavy crystalline bodies, and of the hardness of bone, which are the remains of a calcareous degenerated fibroid tumour. Such apparently solid bodies on being sawed through, are found to contain irregular small spaces, filled with a soft connective or muscular tissue frequently in a state of fatty degeneration; or we find a blackish gray substance scattered through these concrete bodies, consisting of fine granular pigment between striated layers of connective tissue. If such concretions are macerated, they

will resemble pumice-stone, and are particularly distinguished for their weight, and the compactness of their structure. From a dissection of them we learn that they consist of a conglomeration of solid ivory-like portions, connected by a more earthy, chalky-white calcareous substance. This latter substance is never visible in fresh sections, it being only formed by the precipitation of calcareous molecules, scattered in an intermediary substance, which has not yet undergone calcareous degeneration.

Concretions of such structure are either carried without injury, or they may be eliminated by sequestration, and this certainly explains the numerous cases recorded in older literature, of concretions being cast out of the uterus. Bartholin found such a blackish, irregular concretion, which weighed four pounds.

Calcified uterine fibroid tumours were formerly described as stony concretions. Here we must also mention those cases described as *petrification* of the entire uterus (Fobert, Mohrenheim, Mackin, and others, vide Voigtel), in which the organ, almost membranous from atrophy, was overlooked in consequence of the presence of one or several calcified fibroid tumours.

As in fatty degeneration, so in calcification of fibroid tumours, any further increase of the tumour ceases. Frequently calcareous and fatty degeneration affect different portions of the same tumour.

I must also mention, in addition to the above, the transition of fibroid tumours into other adventitious growths. Although celebrated anatomists and gynecologists absolutely deny the possibility of carcinoma being developed from a fibroid tumour, Kiwisch already states that in very rare cases "infiltration of carcinomatous substance" may take place in the tissue of a fibroid tumour, which, in his opinion, however, only occurs accidentally, with simultaneous carcinomatous deposits in other organs. In 1862 a singular specimen was added to the Salz-

burg museum. From a fibroid tumour the size of a child's head, situated in the posterior walls of the uterus, carcinoma had undoubtedly been developed without any other portion of the body being affected, and I am therefore constrained to allow the possibility of such a transition, although I cannot recall a second case of this kind, either in the literature of the subject or in my rather extensive experience.

The number of uterine fibroids found in one individual varies greatly; we may find one, or several. Kiwisch once found forty such tumours of various sizes and consistency.

The consequences following the presence of fibroid tumours have been partly mentioned, as far as they relate to alterations of the position and form of the uterus. Besides the latter organ being increased in volume by the presence of such a tumour, it is also enlarged by hyperplasia, which, as previously mentioned, is most considerable at the point where the tumour is deeply imbedded in the parenchyma of the uterus, or is situated beneath its mucous membrane.

Besides the relative dilatation of the uterine cavity from a fibroid tumour growing into it, dilatation may also be caused by obstruction of the internal orifice or cervical canal by a pedunculated depending tumour, which may occasion hydrometra or hæmatometra so much the more easily, on account of the uterine mucous membrane being, almost without exception, in a state of hypersecretion.

On the other hand the uterine cavity may be completely obliterated by the inward growth of fibroid tumours, the mucous membrane covering the latter, after a preceding blennorrhœa, and being thinned by distention, undergoing the metamorphosis of connective tissue, to be described hereafter, and by which its opposing surfaces become adherent to one another. This, according to experience, is of more frequent occurrence when several fibroid tumours grow from different points of the uterine walls, and become flattened by contact; and, in the majority of cases of this kind, especially where

two tumours grow side by side, filamentous adhesions may be found between them. We have already, when treating of elevation of the uterus, mentioned the *atresia* of the uterine cavity at the internal orifice, resulting from traction induced by a fibroid tumour rising from the pelvis in consequence of its size.

From what we have previously mentioned it is evident that the position of the uterus may be altered by fibroid tumours, inasmuch as the latter displace it by pressure or traction. The uterus may be forced into an oblique position, or it may be pushed downward, and thus uterine fibroids may be the original cause of prolapsus uteri, or may augment an already existing prolapsus. I have also mentioned the partial inversion of the uterus occasioned by prolapsing fibroids, as well as complete inversion, which may be caused by the sudden expulsion of these tumours when attached by thick pedicles.

Another class of displacements to which the uterus is subject in consequence of the development of fibroid tumours, are flexions, especially ante- and retroflexions. The latter are the more dangerous for the reason that a tumour deflected into Douglas' space may be impacted there, and become so enlarged that straightening of the uterus is rendered impossible. Scanzoni mentions, that if a fibroid tumor is developed in the anterior uterine wall, its gradual increase leads first to straightening and then to retroversion of the uterus, whereupon, after the pelvic cavity has become too small, it rises into the abdominal cavity proportionately with its increase in volume. Clinical observations are said to corroborate these changes of anomalies of position. But this can only be valid for those cases in which, from previous anteversion, an imperfect retroversion is developed, for as soon as the fundus uteri is enlarged by a fibroid tumour, it sinks below the promontory of the sacrum, the latter, as is well known, offering considerable impediment to the ascent of the uterus. When a retroflexion of the uterus has been caused by a fibroid tumour, spontaneous straightening

is of course out of question, whilst anteflexion will finally terminate in elevation of the uterus.

In some rare instances fibroid tumours likewise produce latero-flexion of the uterus.

Whilst subperitoneal fibroids produce no alterations of the uterine tissue, excepting hyperplasia in the vicinity of the tumours, yet, almost without exception, we find catarrhal intumescence and blennorrhœa of the mucous membrane when such tumours are situated in the centre of the parenchyma of the uterus, or beneath its mucous membrane.

Fibroid tumours may further exert an injurious influence upon the surrounding organs by pressure, and by displacements of the same. Pressure on the bladder, even without coexisting anteflexion, may become so considerable as to compress it between the symphysis and tumour, giving rise in consequence to secondary phenomena in the uropoetic system. The hyperæmia of the pelvic blood vessels, occasioned by fibroid tumours, is frequently manifested in the mucous membrane of the bladder as a varicose distention of its veins, especially of those situated at the neck of the bladder; and Rokitsansky even observed a case of rupture of a submucous cystic vein, with hæmorrhage into the bladder. Thomson relates a case in which a perforation occurred in the wall of the above organ from pressure of a large fibroid tumour, with adhesion of half of the periphery of the tumour to the borders of said perforation.

On the other side pressure affects the rectum, and defecation may be completely prevented by fibroids impacted in Douglas' space. They may also cause varicose distention of the hæmorrhoidal veins, and hyperæmia of the rectal mucous membrane in the same way as in that of the bladder. Rokitsansky mentions a case in which a fibroid tumour, the size of a hen's egg, developed in the posterior wall of the uterus, caused a portion of the rectum to slough away, and became adherent to the edges of the perforation in consequence of peritoneal adhesions.

Very large fibroid tumours, especially when protruding into the pelvic cavity, will also, by pressing upon the veins coming from the lower extremities, cause distention of the same and œdema of the tissues. Pressure upon the hypogastric or spermatic veins is followed by hyperæmia of the pelvic organs, and a varicose condition of the venous plexuses. Rokitansky observed the rupture of a subperitoneal vein of a fibroid tumour.

The hyperæmic intumescence of the mucous membrane of the vagina and uterus, and especially of the latter, may lead to hæmorrhages into its parenchyma in the form of ecchymoses; or it may cause metrorrhagia. The last-named affection generally only occurs during the presence of fibroid tumours, when they project into the uterine cavity in the form of polypi, and when hypostatic hyperæmia has been developed in their most dependent portion.

In consequence of the derangements of circulation occasioned by fibroid tumours in the above-mentioned manner, perimetritis is frequently developed. The peritoneum, which covers uterine fibroids projecting into the abdominal cavity, is frequently in a state of pseudo-membranous congestion and thickening; pseudo-membranous cords or bands, extending in various directions, are so frequently found that we cannot help considering the above affections as cause and effect.

Finally, we must consider the effects which uterine fibroid tumours exert on the uterus. Experience teaches that menstruation frequently becomes irregular when they exist; gynecologists testify to their injurious influence on conception; and from an anatomical point of view, the presence of uterine catarrh, the frequent and various displacements of the uterus, and the contraction and impermeability of the oviducts occurring under certain circumstances (Rokitansky), may be considered among the causes of sterility.

If conception takes place in a uterus, in the walls of which a fibroid tumour exists, retroflexion of the gravid organ easily occurs if the tumour is located in its posterior wall. As already

mentioned, tumours projecting into the uterus, may be further injurious to foetal development by encroaching on the cavity of the organ, for during pregnancy they are very apt to enlarge.

Fibroid tumours depending from the posterior wall] into Douglas' space will narrow the cavity and outlet of the pelvis; the same may be said of the rare cases of tumours developed in the cervical or vaginal portions.

When fibroid tumours are present, imperfect contractions of the uterus have been observed during labor, owing probably to the diffuse proliferation of connective tissue, and many cases of spontaneous rupture of the uterus are recorded. Owing to non-contraction of the uterus during labor, hæmorrhage occasioned by fibroids may occur.

In many cases of puerperal metritis, the bed of the fibroid tumour may be the point of origin of inflammation, excited by traction exerted upon the attachment between the tumour and uterus in consequence of unequal uterine contraction. I can remember several cases of *purulent sequestration* of uterine fibroids occurring during the puerperal state.

Round uterine fibroid tumours never occur before puberty, and very rarely before the thirtieth year. From that period their frequency increases, and at the climacteric period it is such, that undoubtedly 40 per cent. of the uteri of females who die after the fiftieth year, contain fibroid tumours. At a more advanced age these tumours are generally found entirely or partly calcified, and the uterus at the same time affected with marastic atrophy.

Rokitansky mentions the frequent combination of fibroid tumours with fibroid polypi. The so-called mucous, or vesicular polypi, often met with as consequences of uterine catarrh, are frequently associated with these fibroid tumours.

Of cartilaginous tumours of the uterus (*enchondroma*), we possess no reliable observations.

Under the name of *osseous tumours* of the uterus, calcifica-

tions and ossifications of round fibroid tumours have generally been described. The case described by Krauss of an osteoid tumour of the uterus, also seems to belong to this category, but from its peculiarity is deserving of mention.

“In place of the uterus, a pyriform osteoid tumour was situated between the rectum and bladder, close to the right margin of the pelvic entrance, and extending downward as a cartilaginous mass, in form like the vaginal portion, without an aperture. The thin broad ligaments, together with the oviducts, were inserted bilaterally above the point of transition of the tumour into the cartilaginous appendix. The ovaries consisted of thin, narrow, partly ossified, cartilaginous scales. The tumour being sawn through, exhibited a bony structure, denser in some parts and more porous in others, and in its centre an oblong cavity was found, the size of a walnut, with irregular walls, and a few transverse osseous filaments.”

Krauss thinks that the form of this osteoid tumour renders it presumable that an osseous layer was gradually formed around the whole uterine body, which layer, increasing in thickness, caused the gradual disappearance of the uterine substance under marastic influence. From this it is evident that the term *osteoid tumour* is an inappropriate one. For want of more detailed anatomical facts (I could not obtain the original description) I am unable to derive any advantage from the above case, and it seems to me to be closely allied to the cases of ossified uteri mentioned by Baillie and Sömmering.

CYSTOID TUMOURS.

Literature: Naboth, De sterilitate mulierum. Lipsiae 1707. — Voigtel Path. Anat. Halle 1805. III. Bd. pag. 612. — Nivet et Blatin, Arch. génér. Oct. 1838. — Rokitsansky, Denkschr. d. Wien. Acad. d. Wissensch. Bd. 1. pag. 328 1849. — C. Huguier, Mém. sur les Cystes de la matrice et sur les Cystes folliculaires du vagin. Soc. de chirurg. Mai 1847. — Ch. Robin, Mém. pour serv. à l'hist anat. de la membr. muqueuse uterine de la caducque et des oeufs de Naboth Arch. gén. de Med. 1848. T. XVIII. pag. 257. — Kiwisch, Krankh. des Uterus III. Aufl., II. Bd. pag. 389. — Cruveilhier, Anat. path. Livr. 13. Pl. 4. — Hirsch, Ueber Histologie und Form der Uterus-Polypen. Giessen 1850. — Billroth, Ueber den

Bau der Schleimpolypen etc. Berlin 1855 — L e u d e t und L a b o u l - b e n e Zur Anatomie der follicularen Uterus-Polypen. Gaz. méd. d. Paris. 9 und 27. 1856. — E. W a g n e r, Anatomie der Vaginalport. Arch. für phys. Heilk. 1856. 4. H. pag. 493 — By the same authors B e i t r. zu den Geschwülsten des Uterus. Arch. f. phys. Heilk. 1857. 1. — R o k i t a n s k y, Ueber Uterus-Drüsen-Neubildung in Uterus und Ovarial-Sarcomen. Zeitschr. der Ges. d. Aerzte, Wien. 1860.

The formation of cysts in the uterus is a comparatively frequent occurrence and each portion of the organ is distinguished for peculiar varieties of them. Thus, in the body of the organ, as well as the fundus, we meet with small thin-walled cysts, in the cervix with large distended ones, and in the vaginal portion with others of different construction; this difference depends on the anatomical basis from which the cysts are developed.

The cystoid tumours of the mucous membrane of the body and fundus present the appearance of thin-walled, isolated or aggregated vesicles, scarcely larger than a hemp-seed, and filled with a light yellow, seldom brownish, serous fluid. In many cases, especially when they are situated in the posterior wall, they are so densely crowded together that the mucous membrane looks like a mass of cysts. These vesicles possess a very delicate capsule of connective tissue, the inner surface of which is partly lined with small round cells, and in rare instances their contents consist of a light-colored *colloid* substance.

The origin of these cysts must be looked for in the utricular glands, the excretory ducts of which have been obliterated, and consequently the glands become distended into small serous cavities. They are frequently found in women of advanced age affected with chronic catarrh of the uterine mucous membrane, and they seem to burst after attaining the size of a hemp-seed; and possibly the obliteration of the cavity of the body of the uterus, so frequently combined with senile atrophy of the organ, may be caused in consequence of their rupturing. Sometimes they undergo the process of proliferation with the

mucous membrane, and form so-called *vesicular polypi*. When situated within polypi they are more liable to attain a larger size.

Different from the above are those cysts which we find in the mucous membrane of the cervical canal, and which were mistaken for ovula by their discoverer, Naboth, whence they derived the appellation of *Nabothian ovula*, which term is even now sometimes used.

These Nabothian vesicles are small cysts, generally well filled with viscid mucous, and sometimes exceeding the size of a pea, which are either disposed in rows within the folds of the cervical mucous membrane, or are situated between them, on separate them in various ways. Owing to their presence, the surface of the cervical canal acquires a tuberos appearance; generally we find a much larger number of smaller ones imbedded in the submucous tissue, beneath those which project from the mucous membrane. In one case I met with one in the anterior wall, near the internal orifice, which was nearly as large as a cherry, and it is said they may even attain the size of a hazel-nut.

The contents of these formations consist of a gelatinous viscid fluid, readily soluble in water, in the centre of which you sometimes see a cloudy or well-defined gray or milky white turbescence, which generally consists of an accumulation of oil globules, and cells undergoing fatty degeneration. Besides this, you find here and there ciliary epithelium, large, fatty, granular cells, globules resembling *physalides*, free nuclei, fat drops, colloid bodies, and sometimes crystals of cholestearine.

E. Wagner attributes their origin exclusively to a distention of the normal mucous follicles of the cervical portion, whilst Rokitsansky considers them, in the majority of instances, to be direct *new-formations*. In regard to their development Rokitsansky states, that they first appear as round groups of nuclei, each nucleus being one millimeter in diameter, imbed-

ded at various depths in the submucous tissue of the cervix, that they increase in size whilst the nuclei are being transformed into cells, and that in the commencement they are lined with basement or ciliary epithelium, but at a later period are devoid of either. The large number of mucous follicles in the normal cervix uteri renders the older opinion, which has been accepted by Wagner, the most probable one; and although I have convinced myself of the correctness of the process of their development described by Rokitansky, yet I consider the group of cells mentioned by him as mucous follicles, divided laterally from their median line and exhibiting the cells proper of the glands.

The exuberant growth of the Nabothian vesicles is followed by atrophy of the submucous layer of the cervical portion. When, as is frequently the case, the ring of the internal orifice is the chief seat of the Nabothian vesicles, flexion of the uterus may take place, as has been mentioned under that head. In the case in which I found a distended Nabothian vesicle the size of a cherry, the uterus was immediately anteflexed after I had evacuated the cyst of its contents by puncture. Spontaneous rupture of these productions may also occasion atresia of the cervix. In many cases, Nabothian vesicles developed from the mucous folds, assume the form of pedunculated polypi.

We must now refer to those cysts which are frequently found in large numbers in the vaginal portion. They consist of vesicles varying in size between the point of a needle and a hemp-seed, are round, or flattened by contact, and filled either with a thin yellowish serum, or a yellow or brown colloid substance. In the contents of these, also, we find parent cells with nuclei, colloid bodies and granular fatty cells. Their smooth-walled cavity is lined with cylindrical epithelium, and often with ciliary. Their cylindrical epithelium is generally short; sometimes I have found transitory or basement epithelium with small cells. Sometimes these cysts appear upon the vaginal portion as small round protuberances, and sometimes they are absent (E. Wagner).

According to Wagner the development of these cysts takes place from the glands of the vaginal portion, as follows; the lower third of the gland becomes tumefied and round, whereupon, as this portion increases in size, the superior portion becomes atrophied. This formation of cysts is often found combined with the so-called papillary hypertrophy of the vaginal portion. This is certainly what Virchow means when he speaks of the development of larger follicles in the vaginal portion causing partial inversion of the inferior portion of the cervical canal. Virchow, also, in many cases attributes the proboscis-like and polypoid elongations of the vaginal portion to the abnormal development of such glands.

Besides the cases mentioned, we will now describe some other very rare but extraordinary.

Kiwisch describes a tumour occurring in a woman forty-six years old, which arising from the posterior wall of the uterus, extended down to the pelvic floor, filled the whole of the pelvic cavity, and reached as far upward as the ensiform cartilage, which tumour, after its removal, weighed forty-six pounds. That portion of it situated in the abdominal cavity consisted almost wholly of cysts, resembling common ovarian cysts and filled with a lumpy fibrinous exudation. The largest of these cysts was of the size of two heads. The base of the tumour was formed by a flaccid fibroid tumour the size of a head, enveloped in uterine substance and adherent to the posterior wall of the vagina.

Cruveilhier describes a similar case; and we must call attention to the fact that fibroid tumours were present in both cases, and consequently it is uncertain whether these were not cases of formation of cysts in round fibroid tumours. In the older literature no case of this kind is mentioned.

Rokitansky found in the walls of the body of a uterus, a small cyst with a villous cancer developed from its inner surface, combined with *cysto-carcinoma* of the ovaries and delicate villous vegetations of a carcinomatous character in the peritoneum.

There are also observations recorded of *dermoid cysts* of the uterus. The first one mentioned by Baillie is that of a uterus preserved in the museum of Copenhagen, containing several hairs. Voigtel quotes cases from Fabricius von Hilden and Vicq d'Azyr, in which hair was found in the uterus. The case of Blancard, referred to by the same author, must be considered as a dermoid cyst of the ovary. From the same author we have a remarkable statement, that hair was also found in uterine polypi; but I have been unable to obtain the paper of P. G. Schacher, referred to by him. Meckel speaks of the finding of hair and teeth in the uterus as of common occurrence, without, however, any details on the subject.

E. Wagner found a pedunculated fluctuating tumour in a uterus, the size of a man's fist, containing numerous cavities of various dimensions and thickness of walls, and differing in their contents, mostly communicating with each other, and containing hair, fat, teeth, cartilage and bone. Some portions of their walls were similar to the external integuments, and contained large sebaceous glands and roots of hair. Sudoriferous glands, however, were not found.

Finally, we must mention those cysts forming a capsule around rarely occurring *cysticerci*.

Rokitansky's description of cysts originating in preëxisting or newly-formed glandular elements, which constitute the *adenoid uterine cystosarcoma*, has already been mentioned.

VASCULAR TUMOURS.

L i t e r a t u r e : Rob. Lee, Researches on the pathology and treatment of the most important diseases of women. London 1833. — Kili an, Holscher's Hanov. Annalen I. 1. 1830. — Cars well, Patholog. Anatomy. Fasc. VI. Fig. 2. Tab. IV. — J ä g e r (Erlangen), Beobachtungen über Blutungen im Wochenb. in Folge von Gefässgeschwülsten des Uterus. Holscher's Hannov. Annalen Bd. II. 1. 1837. — B a l l i n g, Geschlechtskrankheiten des Weibes. Göttingen 1836. pag. 632. — M e i s s n e r, Frauenzimmerkrankheiten etc. II. 1. Leipzig 1843 — 1845.

Whilst no mention is made in modern literature of so-called vascular uterine tumours, we frequently meet with this term in older writings, or with that of hæmorrhoidal tumours, or *telangiectasis*.

On closer study of the cases recorded, it becomes evident that two classes were understood by these arbitrary expressions. The first of these classes embraces the observation of hæmorrhages after delivery, resulting in consequence of the tumefaction and non-contractility of the uterus at the point of placental attachment, and includes that which was recently called by C. Braun, *placental polypus*. To the second class belong cases of excessive vascularity of the various adventitious growths, especially the papillary tumours of the uterus, which gives them, in consequence, a red, spongy, and readily bleeding surface. This is undoubtedly the kind of tumour which Jäger considered as the vascular tumour of the uterus. The distention of small veins, so frequently met with in the marastie uterus, and one affected with chronic catarrh, in which numerous stellate injected vessels are seen side by side, may also have been described as telangiectasis.

The most unintelligible description of the above condition is that given by R. Lee, in which the largest portion of a uterus was transformed into a telangiectatic condition.

I am enabled to communicate a case of *cavernous ectasia* of the uterus, observed two years ago in an old woman. The uterus was anteflexed, its substance reddish-yellow, flaccid and traversed by rigid arteries. In the posterior wall there was a circular elevated portion, of spongy softness and two centimetres in diameter; the mucous membrane covering it was thin, slightly "hob-nailed," and of bluish red transparency. The corresponding peritoneal surface was also tumefied, convex, of bluish transparency, and the blood vessels of the peritoneum were very distinct and full. A section made through the tissue was immediately covered with dark fluid blood, after removing which, a delicate framework, with isolated dark spots,

became visible. In the cavities inclosed within this framework and communicating with each other, there was fluid blood. The appearance of this tumour on the whole, therefore, resembled the *cavernous ectasiæ* so frequently met with in the liver, excepting that the framework was much thicker than is usual in similar vascular tumours. The framework itself consisted of smooth muscular fibres, inclosed in connective tissue, and was covered in some places with cells resembling pavement epithelium. In some portions of it there was an outgrowth of connective tissue in the form of densely crowded papillæ without arborescence.

A communication between the cavity of the tumour and the neighboring veins could easily be demonstrated, and at its borders a gradual transition into the flaccid uterine tissue was unmistakably recognizable, partly from an increase of the substance of its frame-work and partly from the entrance of enlarged veins.

The rest of the uterus exhibited marked evidences of previous labor, and both ovaries contained large white bodies (*corpora albida*), indicating that pregnancy had previously existed. I do not hesitate to believe that this *cavernous ectasiæ* was developed from the point of placental attachment, and I do not doubt but that this was a case of paralysis of the above-mentioned point after labor, this portion of the uterus not having undergone regular involution, whilst the rest of the organ had returned to its normal condition, and that the external muscular layer near the peritoneum disappeared, partly from involution and partly from marastic atrophy of the uterus, in such a manner that finally the entire wall of the organ was transformed into this cavernous ectasia. I have already mentioned in a previous chapter that, in consequence of this pathological condition antelexion of the uterus took place.

The productions found in fibroid tumours and described by Virchow as *telangiectatic myoma*, may also be considered as belonging to this class.

CANCROID TUMOURS OF THE UTERUS.

Literature: J. Clarke, Transact. of a society for the improvem. of med. and surg. knowledge. Vol. III. pag. 324. 1809. — Simpson, Edinb. med. and surg. Journ. 1841. — Anderson, Edinb. med. Journ. 1842, und Dublin. Journ. Vol. 26, 78. 1845. — T. St. Lee, On tumours of the uterus etc. London 1847. — Menaud, London med. Gaz. Aug. 1848. — Robert, Des affections du col de l'utérus. Paris 1848. — Robin, Arch. génér. Juli et Octob. 1848. — Frerichs, Jena'sche Annalen f. Physiol. u. Medicin. 1849. — Watson, Monthly Journ. Nov. 1849. — Virchow, Verh. der phys. med. Ges. Würzburg. Bd. I. pag. 106. 1850 (Gesammelte Abhandl. etc. Frankfurt 1856. pag. 1015). — C. Mayer, Verhandl. d. Ges. f. Geburtsk. Berlin. Bd. IV. 1845. — Breslau, Diagnostik der Uterus-Tumoren ausserhalb der Schwangerschaft etc. München 1855. — E. Mikschik, Zur Pathologie des Clarke'schen Blumenkohlgewächses. Zeitschr. Ges. d. Ae. Wien. 1856. Jännerheft. — E. Wagner, der Gebärmutterkrebs. Leipzig 1858. — H. Ziemssen, Zur Casuistik der Uterus-Tumoren I. Virchow's Archiv Bd. XVII. pag. 333. 1859. — L. Mayer, Verhandl. d. Ges. f. Geburtsk., Monatschr. f. Geburtsk. etc. Berlin. XVII. 4. 1864. — Rokitsansky, Path. Anat. III. p. 496. 1844.

The uterine canceroid tumour or epithelial cancer, is a comparatively frequent growth and appears under two forms.

In the description of papillary tumours I have alluded to four different species, the two first of which, the *acuminated condylomata* and *true papilloma*, I opposed as benign growths, to canceroid tumours and medullary villous cancer.

The canceroid papillary tumours of the uterus are developed from the vaginal portion as a hyperplasia of the papillary stratum, in consequence of which they grow from circumscribed points, finally attaining the form of pedunculated tumours; or the papillæ of the vaginal portion become arborescent, and form a round tumour, covered with thick epithelial layers, and having a warty, tuberos, or granular surface. Sometimes this vegetation is limited to one lip of the vaginal portion, the other remaining normal. The disease may be arrested for some time after reaching this stage of development, and consequently Virchow's assumption that these tumours should be

considered simple papillary tumours, is entitled to some credit, although we are obliged to admit, with the same degree of probability, that the true canceroid tumour is developed from such growths, and that canceroid papillary tumours, in most cases, pass through this stage of development before their characteristic elements can be demonstrated.

From what has been said, the relation of the simple to the canceroid papillary tumour is rendered evident. A simple papillary tumour may be developed and exist for years without ever becoming a canceroid ; still, it may be impossible to determine from a microscopical examination or other signs, whether the transition into canceroid will or will not ensue. On the other hand, it may be said that a canceroid papillary tumour in its primary condition is seldom distinguishable from a benign papillary tumour.

To the naked eye the appearance of both tumours is seldom so different as to allow us to draw a definite conclusion in relation to their character ; the microscopical changes, however, and the appearance of a section of a canceroid, are of great importance. Whilst in the benign form, simply an arborescent framework is covered by a more or less thick layer of basement epithelium, in the canceroid tumour, so-called *canceroid alveoles* are developed in the substance proper of the tumour, and also in the "parent tissue," which is affected with hyperplasia of connective tissue. A section, therefore, of such a papillary tumour, presents the same granular appearance, but between the grayish striated framework of connective tissue there are small cavities, sometimes scarcely perceptible to the naked eye, sometimes larger than a pea, and containing a grayish-white fluid, which may be thick and greasy, similar to the secretion of a sebaceous gland (cholesteatoma), and may be removed with the handle of the scalpel as a thick, lumpy mass. Pressure upon the tumour toward the divided surface will cause the evacuation of semi-solid plugs, or a whitish vermiform substance, resembling that evacuated from

comedones (Cruveilhier's cancer aréolaire pultacé). The proliferation of connective tissue generally taking place in the form of arborescent columns, more or less closely adjacent, the intermediary space between them is frequently filled with cylindrical accumulations of the epidermoid substance forming the covering of the tumour. The proliferation of epithelial cells in the interior of these tumours, however, does not always occur in round cavities; frequently they lie in a combination of ramifying ducts, and the origin of this form from endogenous productions of ramifying connective tissue corpuscles was successfully demonstrated by Pohl.

The various cells found in cancroids] differ somewhat in form and manner of arrangement. In the outer layers of the investing substance we find large basement epithelium, and sometimes scaly cells, devoid of nuclei; such being also the productions contained in the *alveoles*. In the vicinity of the framework, which consists of connective tissue, the cells of the investing substance more closely resemble the cylindrical epithelium. In some of the alveoles, especially the smaller ones, the cells are often more cylindrical, and form a lining to the walls of the cavity, whilst in the larger alveoles they lie irregularly, side by side, or around a granular centre, or are concentrically disposed around a sort of "brood-cavity" (Rokitansky).

You will also find, almost without exception, cells undergoing fatty degeneration; free molecular fat; crystals of fat; cholesterine; and finally, in some portions, the usual cheesy transformation of substance.

At the basis of pedunculated tumours the framework of connective tissue is very powerful, containing numerous nuclei, and consisting of delicate fibres. Toward the surface of the tumour it is converted into long arborescent ramifications, in which are found inclosed in the terminal delicate connective tissue comparatively large, but thin-walled blood vessels, forming single or double loops in the extreme villi. It

is evident from this, that canceroid papillary tumours are sometimes exceedingly vascular, and that the danger of hæmorrhage is so much greater, as these growths frequently ulcerate, and are destroyed by spontaneous decomposition. Canceroid papillary tumours are frequently found in a state of *serous infiltration*, and usually the uterus is affected with leucorrhœa during their presence.

Canceroid papillary tumours may be developed from the vaginal portion or from the inner surface of the cervix, and in very rare cases, from the mucous membrane of the body of the uterus.

The second form of uterine canceroid tumours, in comparison to the just-described canceroid *papillary* tumour, presents itself in the shape of a diffuse growth of epithelial cells from the connective tissue of the vaginal portion or cervix, generally near the mucous membrane. In the substance of the part mentioned, nodose or imperfectly defined tumours are developed, containing in smaller or larger alveoles, epithelial cells suspended in a mucous-like intercellular substance; or without the latter and resembling a fatty, smeary mass. A section of such tissue presents the same granular, glandular appearance; but finally the pathological growth, after destruction of the connective tissue, degenerates into a whitish, yellow, soft, or dry friable pulp, the wall of the cervix or vaginal portion being involved in the destruction of connective tissue. Thus the canceroid ulcer is formed, which, according to Rokitansky's unsurpassed description, is characterized by well defined and ragged limits; by deep sinuous exesions at its base; by indurated borders consisting partly of transparent, gelatinous, partly opaque, white and dry epidermoid substance, and by a similar wart-like base, which is generally granular from the alveolar structure of the growth.

The disintegration of the pseudo-plasma having thus commenced, extensive destruction of the uterine substance may ensue, causing in this manner nearly complete disappearance

of the cervix by an ichorus process. During this, the cancrroid extends to the body and fundus of the uterus as well as to the vagina, and appears again in the latter either as a diffuse, or nodose mass in the shape of *placques*. Frequently, in the diffuse form just mentioned, the base of the cancrroid ulcers or the adjacent mucous membrane proliferates as a cancrroid papillary tumour. The blood vessels of the uterus, especially the arteries, are only involved at a later period; for a long time they remain permeable, but finally are eroded, and then profuse hæmorrhage may occur.

A rare instance of the spreading of cancrroids is described by E. Wagner, in which the growth was developed in Douglas' space.

Unless E. Wagner's peculiar form of *medullary fungus* of the uterus be reckoned amongst this class, Förster's *cylindrical epithelial cancrroid* has not as yet been observed in the uterus.

The uterine cancrroid, whether appearing in one or other of the forms mentioned, grows slowly, and readily becomes fatal, either from the occurrence of an ichorous process or profuse hæmorrhage. Sometimes the ichorous process causes it to become detached, and cases are known in which nearly the whole vaginal portion thus affected sloughed away, and recovery took place in such a manner that a funnel-shaped space was found, surrounded by cicatricial tissue, and at the extremity of which the entrance to the cervical canal was situated.

In consequence of the excessive vascularity which sometimes characterizes cancrroid papillary tumours, they were formerly described as *fungus hæmatodes*, *fungoid cancer*, *bleeding polypus*, as a cancer resembling a softened spleen, or as *telangiectasis* of the uterus.

The lymphatic glands in the vicinity of cancrroid tumours, especially the second form, are generally hypertrophied, reddened, sometimes considerably swollen and succulent, and finally cancrroid alveoles are developed in them, as I have ob-

served in a case in which the inguinal glands were considerably affected in this manner.

Cancroid tumours and true carcinoma never occur prior to the years of puberty.

The development of cancroid substance within the uterine walls was first demonstrated by Virchow.

CARCINOMA OF THE UTERUS.

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Carcinoma of the uterus, in the majority of cases, occurs in what we might call a fibrous medullary form, that is, in the rare cases in which we are enabled to recognize and study the primary condition of the carcinomatous growth in the dead body, we find that form which is described under the name of *fibrous carcinoma* or *scirrhus*, whilst in those cases in which the disease proves fatal, we generally meet with the distinct medullary variety of carcinoma. We may, therefore, with certainty assume, that between the two forms of uterine carcinoma, still held distinct histologically by some anatomists, there is always a transition or transformation of the fibrous into the medullary carcinoma. The difference between these forms lying only in the quantitative proportion of their framework to the carcinomatous substance, we need not hesitate to discuss both of them under one head, especially when they occur in such organs as the uterus.

The fibrous medullary carcinoma of the uterus in the majority of cases, affects first the vaginal portion to a various extent, or it appears simultaneously at the inferior portion of the cervix. The form of its first appearance frequently cannot be distinguished, at least with the naked eye, from that process which I have described as diffuse proliferation of the connective tissue of the vaginal portion and cervix.

At the commencement of the disease the tissue of the vaginal portion becomes either uniformly indurated and tumefied, or numerous large tuberosities are formed, generally combined with considerable intumescence, causing marked distention of the superior portion of the vaginal canal, and an increase of the vaginal portion to twice and even ten times its normal size. This may occur without the mucous membrane participating markedly in the degeneration. A section of such a tumefied vaginal portion presents a pale gray or grayish-red, very firm and dense tissue; with the knife you will sometimes succeed in scraping off a small quantity of albuminous slightly turbid fluid, and a microscopical examination of the same will

enable you to recognize a small number of free nuclei and cells with large or multiple nuclei. Upon a close examination of sections, the elements are seen scattered in irregular groups, sometimes rounded, sometimes arborescent, and the proliferation of nuclei and cells will chiefly be found along the course of the blood vessels.

In proportion as the firmness of the tumefied portion diminishes, its fluid becomes more turbid from the admixture of cellular elements; finally, after the tissue has attained a certain degree of softness and elasticity, the fluid which is now easily expressed in larger quantity, becomes milky and creamy. In the next stage of the disease the entire mass degenerates into a pulpy, soft, brain-like substance, which is characteristic of the exquisite medullary form of carcinoma.

Whilst at the outset, the mucous membrane of the vaginal portion or cervix has scarcely participated in the degeneration, at a later period it becomes more contracted, and finally the pathological substance, which by this time has become softer, after destroying the mucous membrane, grows into it, and forms round whitish elevations covered with a delicate turgid net-work of blood vessels. Owing to the confluence of the growths, the inner surface of the vaginal portion or cervix becomes tuberos or uneven; here and there, between the different tuberosities, dark-red remnants of the mucous membrane are still visible; the cavity of the cervix and the entrance to the vaginal portion are also variously deformed and contracted. Finally, the last integument of the carcinoma disappears; it is denuded, and an ichorous process commences at its surface. Thus the cavity of the cervical canal is again enlarged, generally in such a manner, that from the inner surface of the vaginal portion the greater amount of carcinomatous substance is destroyed by gangrene, and finally sloughs away. Frequently the entire vaginal portion has been thus destroyed, the vagina being continuous with a funnel-shaped cavity, the villous shreds and bleeding walls of which exhibit various sinuses, and

taper off in a point toward the internal orifice. Sometimes in cases in which the destruction of the submucous structure extends higher up than that of the mucous membrane, a structure depends from above, affecting a tubular form, and consisting of mucous membrane not yet involved in the carcinoma.

Whilst the destructive and ichorous process extends from below upward, the carcinomatous degeneration spreads further upward, and the adjacent portions of uterine tissue become thickened and indurated by diffuse proliferation of connective tissue (extending framework of the carcinoma); and, whilst in the tissue immediately adjoining the ulcerated portion a creamy whitish fluid is infiltrated, in the tissues beyond we find a scarcely expressible fluid substance; still, the transition to portions with a merely hyperplastic appearance is gradual. In this manner carcinomatous degeneration commencing in the vaginal portion, extends higher and higher to the body of the uterus, and finally even to its fundus.

It is a well-known fact, that a sort of limitation of the carcinoma frequently occurs at the internal orifice. The cause of this may possibly be looked for in the circumstance that the connective tissue, which is the germinal seat of the carcinoma, is predominant in the cervix, whilst the smooth muscular fibres prevail in the body of the uterus. The fact that tuberculosis takes a directly opposite course does not seem to contradict this, the tubercle being developed from the mucous membrane. However, in regarding this condition, we must take into account the fact that individuals are rarely seen who are able to bear such a considerable extension of this disease, life becoming extinct at an earlier period from *cancerous marasmus*, hæmorrhages, or secondary cancerous deposits in other organs. The ichorous process is generally limited at the internal orifice, whilst cancerous deposits in the body of the uterus may, to a certain extent at least, easily be demonstrated.

Hypertrophy of the uterus above a carcinomatous mass, alluded to by other authors, I consider in the majority of cases

to be an early stage of carcinoma; the development of the latter in the vaginal portion and cervix commencing likewise in a manner that cannot be distinguished from proliferation of connective tissue. For this same reason, the analogy between this affection and the development of carcinoma in the stomach, seems to me to be perfect, whilst many authors are inconsistent in their appreciation of these similar processes.

According to the description hitherto given, carcinoma extends from any point of the vaginal portion and cervix in a diffuse manner; still, those cases are not very rare in which it is found in the vaginal portion in the form of nodules. By an increase in size of several such nodules and their final confluence, the transition into the diffuse form is generally established.

In relation to the minuter structure of the fibrous and medullary carcinoma, important investigations have lately been made by E. Wagner, which, however, I have been able to only partially follow up. In the majority of cases of uterine carcinoma Wagner found an intermediary condition between fibrous and medullary cancer, and very frequently in the latter, a sort of alveolar disposition of tissue. The alveoles were mostly in the form of glands or ducts, rarely angular, ovoid or round. Their contents generally consist of cells of peculiar form and disposition, and they closely resemble cylindrical epithelia, and line the inner surface of the alveoles in close apposition. The nearer you approach the centre of the alveoles the more irregularly these cells lie. Amongst numerous cases examined, I have only met with this disposition twice, and for the present must therefore confirm the observations of E. Wagner; still I am ignorant as to whether this alveolar structure of uterine carcinoma is really the most frequent. From a general point of view we might be led to form the opinion, that these were cases of cancroids of the cylindrical epithelial formation described by Förster, still, in the cases examined by myself, although the cells lying closest to the alve-

olar walls were disposed in rows and similar to cylindrical epithelium, yet further inward, and even where they were densely crowded, they were multiform; such as can only be found in a well-developed medullary carcinoma. It is clear that such alveoles are developed from "brood-cavities." Wagner states that he found direct transitions from connective tissue corpuscles to the parent cell, with multiple nuclei and smaller carcinomatous alveoli in the majority of cases.

Besides destruction by an ichorous process, carcinoma sometimes undergoes fatty degeneration, which affects its cellular portions, and is visible to the naked eye upon section as a net-like or dotted configuration. The observation of such rare cases induced Kiwisch to follow the example of John Müller in admitting the existence of a *reticular carcinoma* of the vaginal portion, which is to be distinguished by its lobular form, the net-like disposition of its cellular frame, and its lesser firmness of tissue.

In regard to the mucous metamorphosis, according to the later opinion of E. Wagner (which I am inclined to confirm after careful investigations of such changes in other organs), the *gelatinous cancer* constitutes no particular species, but is an excessive mucous metamorphosis of medullary cancer. Those cases seem to belong here which have been described as *alveolar gelatinous cancer* of the uterus (Rokitansky, Lebert); they seem nearly allied to those described by E. Wagner, in which an alveolar type of medullary carcinoma is perceptible.

The extension of uterine carcinoma offers some peculiarities as regards the organs in contact with it. From the upward course of the previously-mentioned degeneration, the oviducts in rare cases may be involved in the disease.

Frequently medullary carcinoma spreads downward from the vaginal portion to the vagina, and appears there in the form of flat, circular, whitish or whitish-red masses, covering the mucous membrane like mushrooms, sloughing away at the

surface, and thus enlarging the ichorous cavity formed by the destruction of the carcinomatous mass. Rarely, however, does carcinoma extend lower down than the upper third of the vagina.

In many cases the cancerous process involves the lymphatics of the uterus, which consequently degenerate into whitish or whitish-yellow rosary-like ducts, which sometimes extend far up under the peritoneum. The most interesting case of this kind is the one described by Hourmaun, in which, on both sides of the carcinomatous uterus, long plexuses, as thick as a finger, were developed, consisting of knotty lymphatic ducts, which extended as far up as the lumbar vertebræ and diaphragm, and enveloped the internal spermatic artery and vein. It is possible that similar cases have induced Cruveilhier to admit the development of carcinoma from venous vessels, and to consider the cavities of the former filled with liquid as venous canals.

The extension of carcinoma to the posterior wall of the bladder is important and of extremely frequent occurrence. In the commencement, the cellular tissue lying between the cervix uteri and bladder becomes thickened, causing the latter to be attracted to the cervix and the trigonum to become stretched. Upon opening such a bladder from above, it is easy to perceive the excavation at the point corresponding to that of the traction. The cancer next extends into the cellular tissue mentioned, and between the muscular fasciculi of the attracted and hyperplastic vesical wall, and thence spreads more and more in the submucous connective tissue. The mucous membrane at this period frequently appears œdematous, and raised in the shape of flabby yellowish-red transparent elevations, or it may become more tense, the carcinoma growing into it in the form of roundish, knotty prominences, or, which is most frequently the case, in the form of the so-called medullary villous cancer. Frequently the rest of the membrane lining the bladder is in a state of catarrhal intumescence and considerable congestion.

If at this point of the disease the destruction of the carcinoma extends from the uterus to the bladder, the cavity of the latter is ultimately made to communicate with that produced by the destruction of the carcinomatous cervix and vaginal portion. The perforation into the bladder is seldom larger than a silver dollar (U. S.), and frequently in its ragged borders, arborescent carcinomatous vegetations are found.

More rarely, but still frequently enough, the carcinomatous growth takes a direction from the uterus toward the rectum, in a manner exactly similar to its course toward the bladder. It first extends in its framework, attracts the anterior wall of the rectum, and grows through the muscular coat of the intestine, in the form of whitish septa. It also frequently extends into the rectum in the form of medullary villous carcinoma, that is, the mucous membrane is finally involved in the carcinomatous process, or, as is frequently the case, the mucous membrane becomes gangrenous at the point in contact with the pathological growth, and afterward, when the carcinoma is destroyed, a communication between the vagina and rectum is also established.

The peritoneum is generally in a state of chronic inflammation; pseudo-membranous cords and bands bind the pelvic viscera to each other and to the walls of the pelvis; the excavations situated before and behind the uterus disappear in consequence of traction, agglutination, and occlusion; sometimes cancerous substance grows from these points through the peritoneum and fills the excavations. Frequently, besides such tuberosous carcinomata growing into the peritoneal cavity, collections of yellowish serum are found between pseudo-membranous lamellæ, which predominate like cysts and sometimes grow to the size of an orange.

In this manner, from the destruction of the uterine carcinoma, a communication may be established on the one hand with the bladder and on the other with the rectum, so that from the vagina, the upper third of the walls of which are

ulcerated, you have access into a large ichorous cavity, the walls of which are formed of medullary carcinoma in a putrescent condition, with villous, shreddy, dark-brown remnants of tissue hanging into the cavity; in some places the walls feel rough from incrustated urinary salts, in others, fungous growths sprout out, the surfaces of which decompose. The cavity is filled with a chocolate-colored, intensely nauseating fluid, mingled with small coagula, gangrenous shreds of tissue, portions of carcinoma, or fecal matter. The anterior wall of such a cavity you recognize to consist of the anterior wall of the bladder, superiorly is seen the body or fundus of the uterus, united to the fundus of the bladder in consequence of the obliteration of the vesico-uterine excavation, and adjoining this the rectum, the posterior wall of which forms the posterior wall of the cavity.

If imperfect adhesion has occurred at both the excavations of the peritoneum, perforation of the latter may take place in the depths of those spaces, causing the fundus uteri to be suspended from the round and broad ligaments above the distended ichorous cavity.

The cancerous degeneration may also, after involving the bladder, extend to the lower portions of the ureters, in consequence of which they become strictured, deflected in various ways, or finally involved in the destructive process, and thereby causing a dripping of urine into the ichorous cavity.

Outwardly the carcinoma spreads into the subperitoneal areolar tissue as well as that of the pelvic floor, and passes from thence to the pelvic muscles, and the periosteum of the sacral and iliac bones especially, finally involving the bone itself. Not unfrequently in such cases, an abscess is formed inferiorly, which opens in the perinæum and gives rise to ichorous perineal ulcers or fistula of the rectum.

If the lymphatic glands of the pelvis become likewise affected with carcinoma they unite with the mass, and this becomes so enormous as to completely fill the pelvis and involve its

walls throughout. If the large excavations become obliterated by carcinomatous substance and false membranes, frequently, after opening the abdominal cavity and removing the intestines, the pelvic cavity is found filled as high as the level of the superior margin of the symphysis, its superior limit being formed partly by carcinoma, partly by flat false membranes, and above which the fundus uteri projects like a round tumour.

Finally, the spreading of carcinoma to the sheath of the sacral nerves is of some importance (Montault, Kiwisch) as considerable trouble may be occasioned thereby.

Sometimes the disease extends to veins which have previously become varicose and involved in the carcinomatous mass. A phenomenon frequently observed in the venous system is thrombosis, which, especially in ichorous carcinoma, commences in the ramifications which have become involved in the carcinoma, and spreads upward to the internal hypogastric and spermatic veins. An extension of the thrombosis into the common iliac, and also the crural veins, not unfrequently occurs, especially if the cancerous mass has extended far into the pelvic cellular tissue. Thrombosis of the crural veins is more frequently observed on one than both sides, and is soon followed by œdema of the corresponding lower extremity.

It has already been mentioned that when carcinoma extends beyond the uterus, perimetritic false membranes are generally formed, which extend in various directions, and cause adhesions between several pelvic viscera. Frequently the oviducts and ovaries are thereby involved in the disease in such a manner as to be completely lost in the pathological mass, false membranes rendering isolation of them extremely difficult. Frequently, however, this pseudo-membranous attachment of the neighboring movable organs extends further up, and, in consequence of iliac peritonitis, the cæcum and the appendix vermiformis may become adherent on the right, and the sigmoid flexure, as well as some of the lower intestinal

convolutions, may become adherent on the left. It then happens, especially where the carcinomatous degeneration extends up to the fundus uteri, or in the rare cases in which the disease was primarily developed at the fundus, that the degeneration also involves the adhering portions of intestines, and by the process of destruction of the pathological mass, the cavities of the intestines are made to communicate with that formed at the lower portion of the uterus. Perforation of adherent portions of intestines may also occur in another manner from the ichorous process to which carcinoma is subject (Chomel, Kiwisch, Rokitansky). The lower portion of the omentum majus also often becomes adherent to the carcinomatous mass.

Medullary carcinoma of the uterus is usually the primary deposit of cancer in the system, and cancerous growths of the medullary form occurring in other organs are secondary to it. The most frequent of such secondary forms are, cancer of the inguinal, lumbar, and retro-peritoneal glands, ovaries and breasts.

Cancer of the uterus has been known to occur secondarily to a similar affection of the ovaries, and in very rare instances, as a continuance of primary carcinoma of the vagina and peritoneum. Cancer of the fundus uteri, when developed in its peritoneal covering, appears at the commencement as subperitoneal, isolated, or confluent medullary knots, which gradually extending deeper into the parenchyma, the entire substance of the fundus becomes carcinomatous.

As already stated, the usual seat of uterine carcinoma is in the cervix and vaginal portion, but still, cases are known in which it was primarily developed from the body and fundus of the uterus. In the rare cases of primary cancer of the body of the uterus, it almost always, without exception, arises nearer the external orifice than the fundus. From the latter it generally grows into the distended cavity of the organ, in the shape of irregular lobular tumours, which soon become involved in ichorous destruction.

Kiwisch observed a remarkable case in which primary cancer was developed from the fundus of an inverted uterus.

I had occasion to see a case of uterine carcinoma, which originated from the posterior, superior, and lateral walls of the body of the uterus. I have deposited the specimen in the museum of Salzburg, and the case is of peculiar interest, as it evidently proves that medullary carcinoma may be developed from the round fibroid tumour. The pathological growth represents a tumour larger than a child's head, which so enlarged the uterus as to cause it to resemble one at the fifth month of pregnancy; inwardly, the tumour covered by a layer of uterine muscles, projected from the left side into the dilated uterine cavity, and was everywhere well defined, and enucleable from the uterine substance like a fibrous tumour. Sloughing had occurred in its lower two thirds, and ichorous destruction in its lowest portion; in its upper third perfect medullary cancer was recognized at the same time with fibromuscular tissue. Besides this the uterus had spontaneously ruptured transversely in its left lower portion, and the woman died from hæmorrhage. The portions of the tumour mentioned by myself as being distinctly and unmistakably fibromuscular, cannot be considered as fibrous portions of a carcinoma, the distinct demonstration of the presence of muscular fibres contradicting such a supposition.

Carcinoma of the uterus is followed by a peculiar *marasmus*, common to every medullary cancer. Still, in regard to this, it cannot be denied but that it may exist comparatively a long time before the general phenomena of the so-called *cancerous cachexia* are developed. Rokitansky mentions as the most remarkable phenomena occasioned by uterine cancer, *osteomalacia* of the bones, *anæmia*, and *fatty* and *amyloid degeneration* of the liver, spleen and kidneys. A considerable hydrometra is also sometimes produced, in consequence of occlusion of the cervical canal by the cancerous growths.

Uterine carcinoma, in consequence of ulceration of large vessels, may suddenly prove fatal from hæmorrhage. Death may also be caused suddenly by an embolus, where there is thrombosis of the large veins of the cancerous mass.

The remote consequences of carcinoma of the uterus are, *impeded passage of urine* through the ureters, *amyloid degeneration* of the kidneys, or *hydronephrosis*, and not unfrequently we meet with *parenchymatous nephritis*, and even abscesses, in consequence of the stagnation of the urine in the kidneys. General peritonitis may also cause death quite suddenly, in consequence of perforation; but this is a rare occurrence in comparison to the frequency of the perforation of Douglas' space, and I find that the unfrequency of general peritonitis is owing to the circumstance that the above-mentioned space is generally closed by false membranes, and also, that the ichorous fluid always finds a free escape below and consequently cannot easily get into the abdominal cavity; at least I have seen several cases of ichorous destruction of the floor of Douglas' space without any signs of general peritonitis.

Carcinoma of the uterus is also frequently combined with dysentery, ascites, and dropsy in all its forms, especially œdema of the lower extremities from thrombosis of a crural vein; the latter is always the cause of œdema limited to one of the lower extremities. The other dropsical phenomena are partly the consequences of anæmia and partly of consecutive affections of the kidneys. Finally, in most cases there is œdema of the lungs. Not unfrequently also, we meet with diphtheritic patches in the bladder and rectum; and especially the œdematous portion of the vesical mucous membrane around the trigonium, previously mentioned, seems to be the primary point of origin of this pathological formation.

In opposition to the above phenomena, which inevitably lead to death, the universally acknowledged possibility of spontaneous recovery from uterine cancer, is interesting. Not unfrequently do we observe in cancer of the vaginal portion of the

uterus, that it sloughs away, but generally a new growth of carcinoma is developed from the ulcerated surface. In extremely rare cases, ulceration and sloughing of a carcinoma limited to the vaginal portion, takes place, the loss of tissue being relieved by cicatrization, in consequence of which the vagina and body of the uterus are drawn together, and the cavity of the former terminates in a cone at the internal orifice, which, in consequence of the sloughing, has become the external one (Rokitansky and Scanzoni).

Besides this mode of spontaneous recovery, Kiwisch observed a kind of gangrenous sequestration in a uterus affected with carcinoma. Scanzoni's patient, however, died of cancer of the right breast, in a year and a half after the sloughing of the carcinoma.

According to the teaching of experience, uterine carcinoma does not absolutely prevent conception, so long as destruction of its tissue has not commenced. Females thus affected may conceive; still, during labor, the danger of rupture of the cervix and vaginal portion from softening is very great, which accident may also give rise to profuse hæmorrhage; and in consequence of severe contusion, rapid gangrene and puerperal endometritis may easily ensue.

Medullary cancer rarely occurs before puberty, and the twelve cases in which Madame Boivin says she observed carcinoma in females under twenty years (amongst 409 patients affected with it), render her numerical statements unreliable. The cases recorded by Lever, Kiwisch, Lebert, Scanzoni and Chiari embrace 440 observations, which, arranged according to the percentage of the age of the patients, gives the following result:—

Between 20—25 years there were 4 cases, or 0.9 per cent.					
“	25—30	“	21	“	4.7
“	30—40	“	121	“	27.1
“	40—50	“	175	“	39.2
“	50—60	“	87	“	19.5
“	60—70	“	31	“	5.9
Above	70—	“	5	“	1.1

Taking into consideration that the absolute number of females from fifty years upward decreases very rapidly, it becomes evident from the above table that the frequency of the occurrence of uterine carcinoma rapidly increases with advancing age. From an approximate calculation, made from the records of the Vienna hospitals for several years back, the result is that about 0.9 per cent. of the deaths of females was from carcinoma. Kiwisch remarks, that in no less than two-thirds of the cases of cancer in females the disease is located in the sexual organs, and in the majority, in the uterus.

Sometimes the so-called villous form of medullary carcinoma, or villous uterine cancer, is developed either from the point of origin of the common medullary carcinoma, especially after it has penetrated the uterine mucous membrane (Rokitansky), or it arises directly from the mucous membrane. In the latter case it has either originated from distinct circumscribed portions of the mucous membrane, and forms, as previously mentioned, the fourth class of papillary tumours of the uterus; or the whole mucous membrane proliferates into villous cancer, and, according to my observations, chiefly or exclusively that of the fundus and body. The excrescences, which are generally very delicate and thickly crowded, are distinguished for their extraordinary vascularity, they are almost always dark red in color, very soft, and surrounded by a thick, creamy fluid. Sometimes they distend the cavity of the body and fundus of the uterus, similarly as *vesicular polypi* do, into round fluctuating tumours the size of an apple, and in such cases where the excrescence occurred near the internal orifice, causing obliteration of the latter, coagulated blood or hæmatometra is likewise found in the cavity of the uterus. Rokitansky mentions that the arborescent framework of the villous cancer sometimes grows out into long rosary-like filaments, either single, or branching, and depending far into the vagina.

Another form of cancer, likewise occurring in the uterus in some instances, is the *melanotic* or pigment cancer.

As far as I can remember, to this day there is no case known of primary melanotic cancer of the uterus. It sometimes appears, coexisting with similar productions in other parts of the body, either in the shape of nodules growing from the peritoneum into the substance of the uterus; or, isolated knots are found in the external layer of the uterus, simultaneously with growths of the same kind in the peritoneum. I remember, however, a case, I saw in Rokitansky's Anatomical Institute in Vienna, of diffuse spreading of melanotic carcinoma in a hypertrophied uterus, combined with cancerous productions in both ovaries.

TUBERCULOSIS OF THE UTERUS.

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Tuberculosis of the uterus commences in the mucous membrane of the organ, and thence extends into the deeper tissues, especially the submucous stratum.

At first the mucous membrane appears to be congested and swollen, especially in isolated portions of the walls of body and fundus; afterwards, small yellowish-gray tubercles, scattered or grouped, are developed in it, varying in size from a millet to a hemp-seed, and which, when examined microscopically, are recognized as conglomerations of small round granular nuclei.

This affection is at first limited to isolated portions of the fundus, then it spreads downward toward the internal orifice,

and even beyond to the mucous membrane of the cervix. The tubercles first formed, increase in size, their color changes to a dark or pale yellow, and finally they ulcerate, perforating the mucous membrane simultaneously, and producing a small round ulcer with a yellowish-white indurated margin. The base of this ulcer is uneven, fissured and corroded, and is composed of a whitish-yellow tubercular substance. Around its margin the mucous membrane is generally considerably injected. In consequence of the confluence of several such tubercles into one, and owing to their subsequent ulceration, larger portions of the inner surface of the uterus are, as it were, eaten away and covered with a cheesy, fatty, pulp-like substance. Upon section, the mucous membrane is found degenerated throughout its entire thickness into the above pulp-like substance.

The further extension of tuberculosis into the muscular tissue of the uterus, seems, in many cases, to be preceded by a hyperplastic condition of its connective tissue, in which proliferation of nuclei peculiar to the tubercle, takes place. The ulcerative process first commences in the tubercles of the mucous membrane, then extends, sometimes irregularly, into the parenchyma at various depths, producing at certain points, cavities in the uterine tissue. In many cases, the *caseous* degenerated tuberculous substance, broken up into isolated particles and suspended in an exuded fluid, accumulates in the cavity of the uterus in consequence of an accidental closure of the internal orifice, and causes a distention of the body of the organ resembling hydrometra (Rokitansky).

Very frequently tuberculosis of the mucous membrane of the uterus is combined with a similar affection of the oviducts. When such is the case, either the former or latter is the primary affection, or, tuberculosis has been developed simultaneously in both organs. More frequently, however, according to my experience, tuberculosis of the oviducts seems to be the primary affection.

Contrary to what we observe in carcinoma, tuberculosis of the uterus is developed and extends from above downward, and often the internal orifice limits its further progress. However, as in carcinoma, exceptions also occur here; the disease may even primarily be developed in the cervix, but such cases are exceedingly rare. I have seen such cases of cervical tuberculosis which resulted in the formation of a cavity in the wall of the cervix, and I presume that this cavity was first a Nabothian vesicle, from the walls of which tuberculous ulceration may have extended, which is often the case. Tuberculosis may likewise extend from the cervix to the vagina.

Kiwisch also mentions the occurrence of tubercular granulations in the vaginal portion of the uterus, and the development in it of small lenticular, corroded, tubercular ulcerations, which are generally arranged in small groups.

The uterus is rarely the primary seat of tuberculosis; most frequently it coexists with advanced pthisis of the lungs and the retro-peritoneal lymphatic glands. Besides tuberculosis of the oviducts already mentioned, we frequently find a similar affection of the peritoneum existing as a complication.

A remarkable fact is the frequent occurrence of this disease after the puerperal condition, even after the uterus has undergone nearly complete involution. In such cases, tuberculosis commences at the point of placental attachment, and the fatty degeneration of the muscular fibres of the uterus, which as a rule follows the puerperal state, is somewhat increased, and causes a uterus thus affected to be soft and friable. That a uterus affected with tuberculosis may still conceive, seems to be proved by Cooper's case, in which a female in the third month of pregnancy died from spontaneous rupture of the uterus, which on examination was extensively affected with tuberculosis.

As regards the frequency of this disease, Kiwisch remarks that amongst forty women dying of tuberculosis, its presence in the uterus was observed in about one. The youngest

female affected with tuberculosis of the uterus observed [by Kiwisch, was fourteen years old, the oldest seventy-nine years, consequently no period of life seems to be exempt from it.

Rokitansky likewise describes a case of acute tuberculosis of a puerperal uterus, which is the only one known in literature to this day. The inner surface of this uterus, the walls of which were thickened (six lines at the fundus, ten lines at the point of placental attachment), was covered with a bloody, dirty, grayish-red secretion, and presented an unusual appearance, its mucous membrane being marked with fine erosions from small grayish or grayish-yellow distinct tuberculous granules, varying in size up to that of a millet-seed. The membrane presented the appearance of a loose, succulent, areolar stratum, infiltrated throughout with the above granules. The entire thickness of the substance of the uterus beneath it, as far as the peritoneum, was likewise infiltrated with the same granular substance, as was also that portion to which the placenta was attached. Beside this, here and there the tissue of the organ appeared softened, and pale, yellowish, opaque points were seen, which proved to be accumulated molecules of fat, resulting from fatty degeneration of the muscular fibres. The granules consisted of groups of nuclei, and the fibres of uterine tissue exhibited an abundance of nuclei, though varying in number. In some places the original nucleus had been elongated, and replaced by a few newly-formed nuclei; at other points the fibres presented the appearance of longitudinal rows of nuclei, or, from an excessive growth of the latter, had wholly disappeared. The mucous membrane of the oviducts was also infiltrated with gray tubercular granules; in addition, besides old tubercles, the lungs were found affected throughout with acute tuberculosis, and the liver exhibited fatty degeneration. The woman was thirty-four years old, and had given birth to an eight-month male child nineteen days before death. Rokitansky, whose description I have followed on account of the importance of the case, states

that the development of the tubercles having only taken place after delivery, *the puerperal uterus should therefore be classed amongst the organs subject to simultaneous affection with acute tuberculosis of the lungs, and in consequence of its increase in substance, it is apt to be a favorite seat for the development of tubercles.* In other respects he considers the case important, because it proves that an existing predisposition, in consequence of the puerperal condition, may terminate in an acute production of these pathological formations.

(Appendix.)

ENTOZOA AND ENTOPHYTA OF THE UTERUS.

Literature: F a h n e r, Beiträge zur gerichtl. u. pract. Arzneikunde Bd. 1. 1799. Nr. XI. pag. 98. — S c h l e g e l, Material. für die Staatsarzneiwissensch. St. III. pag. 158. — W i l t o n, Lancet 1840. Nr. 19. H y s l o p, Monthly Journal April 1850. — R o k i t a n s k y, Handb. der spec. path. Anat. 1842. II. Bd. pag. 539. — S t u a r t W i l k i n s o n, Lancet. Octob. 1849.

We find numerous descriptions in the older literature, of *vesicular worms* of the uterus, which were confounded with the so-called *hydatid* moles. The only well authenticated case seems to me to be the one mentioned by Rokitansky, which was an *acephalocystic sac* in the uterus.

With some degree of probability, we may also admit the observations of Hyslop and Wilton to be cases of *echinococcus altricipariens* of the uterus. Hyslop observed three cases of echinococcus in the uterus, and the only thing which might render this doubtful, is, that he should have been able to observe three cases of an affection which the most experienced pathological anatomists never met with. The encysted echinococcus, after rupture of the germinal cyst, had escaped into

the vagina, and was small and semi-transparent in appearance. Another cause of doubt is the occurrence of all three cases in females capable of being impregnated.

In Wilton's case, the cyst forming the capsule, ruptured into the peritoneal cavity, and the only question is, was this not an echinococcus of the peritoneum which had become adherent to the uterus, and caused an indentation into its substance by pressure, which was afterward considered an enveloping cyst formed by the uterine tissue? Although the original paper has not come into my hands, the extreme rarity of such an occurrence must give rise to well-founded doubts.

Schlegel's case of *tænia hydatigena*, as it is called, mentioned by Voigtel, is a very peculiar one. According to the description given, it must have been a *cysticercus cellulosæ*; "its length was two inches, and it was suspended by its head, which was retracted toward its neck, to one end of the encircling cyst, causing the latter to be somewhat inverted at this point."

In the case of Meckel, quoted by Fahner, possibly an *echinococcus altriciparius* may have been present.

Küchenmeister in his work, makes no mention of uterine entozoa.

The observations of *entophyta* are fewer still. Stuart Wilkinson describes a case in which *thallus-filaments* one 1-8000 to one 1-4000 of an inch in diameter, were found in the uterine discharge of a woman seventy-seven years of age, affected with blennorrhœa and *puritus vulvæ*; also oval and round granules, with and without nuclei, and molecules. The thallus-filaments on being treated with acetic acid were transformed into long cells. Stuart Wilkinson called these entophyta "*lorum uteri*." I have some doubts but that these fungi may have originated in the vagina.

ANOMALIES OF NUTRITION.

The anomalies of nutrition of the uterus, like those of FORMATION, may be divided into two classes according as the supply of nutritive material is increased or diminished, without the *formative process* in the organ having undergone any alteration; or, as has been mentioned in the INTRODUCTION, in so far as the chemical process of nutrition, or its effects upon the elements of tissue appears abnormal.

To consider inflammation among the *quantitative* alterations of nutrition, is open to some doubts which I do not underrate, still, it will be admitted that *true parenchymatous inflammation* consists essentially of an abnormally increased nutritive process, and this may justify our classification. Under the head of QUANTITATIVE ALTERATIONS OF NUTRITION, *hyperæmia* is also considered, so far as an increased or diminished afflux of blood must exert some influence upon nutrition. As an immediate consequence of hyperæmia, *hæmorrhage* is the next to come under consideration.

The results of *qualitative* alterations of nutrition in the uterus, are only known as *fatty* and *amyloid degeneration*.

A. QUANTITATIVE ALTERATIONS OF NUTRITION.

If we divide nutrition into two factors, one of which, the afflux of blood, being to the other, the reception of nutritive

material, as *nutritive irritation* is to *nutritive irritability*, all the quantitative anomalies of nutrition may be classified according to this principle. Increased, as well as diminished afflux of blood is characterized by anatomical changes, and although in inflammation we presuppose an increased afflux, still, the principal morbid condition seems to arise from the elementary parts, and therefore we discuss the anomalies contained in this chapter in the following order:—HYPERÆMIA of the uterus; HÆMORRHAGE; HYPERTROPHY and ATROPHY; INFLAMMATION in its various forms; the ULCERATIVE PROCESSES; and finally RUPTURES of the uterus. The consideration of all these affections, excepting the last, relates to the non-gravid uterus.

1. CONGESTION OF THE UTERUS. HYPERÆMIA.

Hyperæmia, as a physiological action, occurs in the uterus periodically from the beginning of puberty to the termination of sexual life as *menstrual* hyperæmia, and the anatomical changes occurring with it are essentially the same as those of *morbid* hyperæmia.

Hyperæmia affects either the mucous membrane of the uterus separately, or simultaneously with its muscular substance, and the anatomical phenomena of hyperæmia of the mucous membrane vary according to the age of the patient, and the form of hyperæmia.

The changes which take place during menstrual fluxion have already been described, and it is certain also, that in morbid hyperæmia of a uterus capable of impregnation, the elongation of the utricular glands, already mentioned, is sometimes very considerable.

After the period during which conception may take place, the turgescence of the hyperæmic mucous membrane is generally of a darker red, and the membrane is more considerably relaxed, but we rarely meet with the same increased thickness of the membrane, which depends chiefly upon the condition of its glands.

Hyperæmia of the uterus is either active (*fluxion*), or passive, that is, caused by impeded venous reflux. The former occurs most frequently during the period in which conception is likely to occur, and undoubtedly is in close relation to the sexual function. Menstrual hyperæmia may be abnormally increased, or the changes accompanying it may be of longer duration. In regard to increased menstrual hyperæmia I must mention a certain condition to which Rokitansky called my attention. We at times meet with considerable hyperæmic intumescence of the uterus, especially of its mucous membrane, sometimes greatly exceeding the normal measure of the menstrual process; simultaneously with this, we also find in one or other ovary, a *corpus luteum* of a much larger size than one of ordinary menstruation. Rokitansky explains these occurrences in the following way; that conception probably took place, but the impregnated ovum did not become attached, and consequently abortion occurred in the first days of pregnancy. In many cases it is scarcely possible to give any other explanation, but the age of the corpus luteum should always be taken into consideration, for its mere increase in size may have been occasioned by an increase of menstrual fluxion into hyperæmia, under the influence of which the corpus luteum may attain a size usually only met with after conception has taken place.

Independently of the sexual functions, however, active hyperæmia of the uterus may occur, and may continue to exist as habitual chronic hyperæmia occasioned by various adventitious growths developed in consequence of it.

Peculiar forms of hyperæmia, which have been termed venous, sometimes affect the uterus in the course of typhoid diseases, eruptive fevers, especially small-pox, and the so-called *dissolutions* of the blood.

Passive hyperæmia of the uterus depends either upon general derangements of venous reflux, consequently impediments

of circulation, affections of the heart, impediments in the vena cava ascendens; or it originates from local causes, as for instance, displacements of the organ, causing traction or compression of the veins coming from it, especially flexions; also, from thrombosis of the spermatic and hypogastric veins, the latter frequently being a continuation of thrombosis of the crural vein; and also from pressure upon the veins mentioned.

The primary consequences of hyperæmia are *enlargement* of the uterus, formative irritation of its connective tissue, and development of diffuse proliferation of the latter (*chronic engorgement*). Hypersecretion of the mucous membrane of the uterus is induced, the secretion of the glands of the cervix becomes thicker and more viscid, so-called Nabothian vesicles are developed, and undoubtedly from simple hyperæmia, *polypi* of various kinds may originate, and the development of other adventitious growths may commence with it. A further consequence of hyperæmia is hæmorrhage, and finally, it may turn into inflammation.

Hyperæmia either affects the whole uterus uniformly, or is confined to one or other portion of it—frequently the vaginal portion and cervix. The former, after passive hyperæmia has existed for a certain length of time, becomes of a spongy intumescence, and, owing to the permanent dilatation of its blood-vessels, easily bleeds. Active hyperæmia also frequently causes considerable tumefaction and induration of the cervix uteri.

From what has been stated it is evident that hyperæmia may either disappear, or result in so-called *chronic hyperæmia*, with permanent proliferation of connective tissue. In this condition its external phenomena may disappear in consequence of contraction of the newly-formed connective tissue, or the enlargement of the blood-vessels may continue, causing succulence of the tissue of the uterus and blennorrhœa of its mucous membrane.

In females who have never menstruated, and in children, the uterus, after death, frequently presents a dark-red appearance,

which might lead us to suppose that it was due to hyperæmia, but it is in fact merely owing to the greater succulence and a certain transparency of the recently developed connective tissue.

2. HÆMORRHAGE FROM THE UTERUS. METRORRHAGIA. MENORRHAGIA.

Literature: Leroy, Leçons sur les pertes de sang, etc. Paris 1801.—Goffin, Essai sur les hemorrhag. en général et particulièrement sur la ménorrhagie. Paris 1815.—Duncan Stewart, Treatise on uterine hæmorrhage. London 1816.—Cruveilhier, Anat. patholog. Livr. 24. pl. 2.—Brierre de Boismont, De la menstruation etc. Paris 1842.—Kiwisch, Klin. Vortr. 1845. I. pag. 318.—Dufourd, Traité pratique de la menstruation, etc. Paris 1847.—Chiari, Braun und Späth, Klinik der Geburtsh. u. Gynäcologie, Erlangen 1852. 2. Lief. 11. Beitr. pag. 167.—Chiari, Menorrhagie u. Metrorrhagie. Ebendas. pag. 703.—E. J. Tilt, Diseases of women and ovarian inflammat. 2 Edit. London 1853. Oppolzer, Ueber die Ursachen der Metrorrhagie bei Nichtschwängern Allg. Wiener med. Zeit. 1858, Nr. 22.

Hæmorrhages of the non-gravid uterus are divided into *external*—when the blood escapes per vaginum (so-called flooding)—and *internal*, when the hæmorrhage occurs within the tissues of the organ. (Cruveilhier's "UTERINE APOPLEXY.")

Hæmorrhage occurring from profuse menstruation, is termed *menorrhagia*; when it takes place between the menstrual epochs, or independently of them, it is simply called *metrorrhagia*. It is, therefore, natural that the morbid processes which finally give rise to metrorrhagia must previously, in the majority of cases, produce menorrhagia.

The causes of metrorrhagia are partly traumatic, partly dependent on uterine affections, and partly due to alterations in the blood. It is developed from excessive hyperæmia of the uterus, and is accompanied by extravasations the size of hemp-seeds or lentils, into the greatly relaxed and swollen mucous membrane. Probably under this heading that affection must be included which has been described as *hæmorrhagic metritis*.

Acute catarrh of the uterus is sometimes accompanied with hæmorrhage. In the course of chronic catarrh, however, hæmorrhages occur, especially when various growths, as mucous polypi, have been developed from the uterine mucous membrane. These growths are often exceedingly vascular, and very small ones may give rise to fatal hæmorrhage. This is caused either from rupture of their delicate vessels under the influence of an exacerbating hyperæmia, or occurs in consequence of a so-called *hypostatic* hyperæmia from the lowest portion of a pedunculated depending polypus, or, by a destruction of this portion. The same may be said of the fibrous polypi of the uterus. Fibroid tumours likewise cause metrorrhagia in consequence of hyperæmia of the uterine mucous membrane, and from the hyperæmia engendered by the pressure they produce in the venous plexuses, especially when they are developed beneath the mucous membrane. The excessive vascularity of the so-called *papillary tumours* has already been mentioned as a frequent cause of exhausting hæmorrhage.

Carcinoma of the uterus in the same manner, partly also by erosion of large blood-vessels (as the uterine artery or its larger branches), may give rise to the most violent metrorrhagia, which may hasten the fatal termination of the disease, even before the marasmus, consequent upon the presence of cancer, has exhausted the patient. Cancroid tumours, especially Levret's and Herbiniaux's "bleeding polypus," also frequently give rise to considerable hæmorrhages.

Lastly, we must mention the rare cases of rupture of the non-gravid uterus and the various ulcerative processes, which latter may cause hæmorrhage by erosion of the blood-vessels, or from profuse granulations.

In the course of many diseases, as for instance, in typhus, the eruptive fevers, the typhoid stage of cholera, acute yellow atrophy of the liver and septicæmia, hæmorrhages from the uterine mucous membrane occur, in consequence of passive

hyperæmia. The hæmorrhages of scorbutic females, as well as of those suffering from *hæmatophilia*, generally occur under the form of menorrhagia. Kiwisch observed that in scorbutic women profuse metrorrhagia occurs during the process of involution after the puerperal state.*

In organic diseases of the heart, with considerable pulmonary affection, menorrhagia especially, and frequently intense metrorrhagia, is produced. The metrorrhagia which sometimes accompanies early menstruation and precocious development of the sexual organs, or occurs in consequence of mental impressions, Chiari considers to be due to derangements of innervation.

Kiwisch classifies the causes of metrorrhagia and menorrhagia as follows. Causes due to constitutional anomalies or diseases of organs lying outside to the sexual sphere: to these belong, *first*, menorrhagia from precocious development of the system, and particularly of the sexual organs; *second*, menorrhagia and metrorrhagia from dyscrasia; *third*, menorrhagia and metrorrhagia from impeded circulation; *fourth*, from congestive and inflammatory affections of the organs surrounding the uterus. Causes due to irregularities within the sexual apparatus: *fifth*, precocious development of the sexual organs; *sixth*, abnormal irritability of the latter; *seventh*, relaxation of tissue; *eighth*, acute (hæmorrhagic) metritis; *ninth*, reception of morbid products, to which may be added, *tenth*, the influence of external injuries, causing so-called secondary menorrhagia and metrorrhagia.

The extravasated blood either escapes, or is retained within the cavity of the uterus from stenosis of its orifices, and thus gives rise to hæmatometra and the phenomena described under that head.

* Wachsmuth relates the case of a young girl belonging to a family affected with *hæmatophilia*, who bled to death on the first night of her marriage, in consequence of rupture of the hymen. (Virchow's Pathologie, etc., 1854, p. 265, vol. i.)

The consequences of metrorrhagia are those of hæmorrhage in general: *anæmia* and *dropsical phenomena*.

Hæmorrhage into the tissue of the uterus, as a rule, only occurs in aged females, and was described by Cruveilhier as *apoplexy of the uterus*. The entire uterus in such cases is in a state of marastic atrophy, flaccid, soft and friable. Upon its divided surface the rigid arteries project somewhat, appearing as whitish non-retracted vessels. The mucous membrane of the posterior wall especially (sometimes exclusively), and the subjacent tissue to various but never considerable depths, appears dark-red, friable, and transformed into a uniform mass resembling coagulated blood. Cruveilhier, according to the thickness of the affected layers, distinguishes three varieties or degrees of this disease, and remarks, that when the hæmorrhage has occurred beneath the mucous membrane into the substance of the uterus, hypertrophy of the latter always exists; of which fact I have never been satisfactorily convinced. Sometimes in this affection small coagula are found in the cavity of the uterus; and I can likewise recall cases in which I found slight hydrometra, and an accumulation of viscid mucous without any admixture of blood, which fact affords sufficient proof that the hæmorrhage occurred exclusively within the parenchyma of the organ. The mucous membrane of the cervix and vaginal portion never participate in this affection.

The inner surface of the uteri of aged females sometimes appears discolored (yellowish and rusty brown) to the depth of a line, and is friable and infiltrated with fatty molecules and granular and yellow pigment, which Rokitansky considers to be residua of uterine apoplexy.

3. HYPERTROPHY OF THE UTERUS.

Literature: Lisfranc, *Gaz. méd. de Paris*. Nr. 61, 64, 73, 1833.—Simpson, *Monthly Journ.* Juni, Aug. Nov., 1843, und March 1844.—Kiwisch, *Kl. Vortr.* Prag. 1845. 1. pag. 104.—Jäschke, *Erfahrungen über die chron. Gebärm. Entzündung.* *Med. Zeitg. Russlands* 1846. Nr. 22 and 28.—O. Prieger, *Ueber Hypertrophie und die harten Geschwülste des Uterus.* *Monatscher. f. Geburtsk.* Berlin 1853. März.—Scanzoni, *Krankh. d. weibl. Sexualorg.* Wein, 1857. pag. 141.—Oppolzer, *Kl. Vortr. etc.* in *Wittelshöfer's med. Wochenschr.* Wein 1858. p. 328.

According to what has been previously said, genuine hypertrophy of the uterus is an enlargement and intumescence of the organ, caused by a surplus of nutritive material received into its elementary parts; and I have already described the enlargement of the uterus during menstruation as a physiological hypertrophy. We consequently speak of hypertrophy of the uterus as a disease, in the strict acceptation of the term, in such cases only where a surplus of nutritive material is received into its tissue by abnormal irritation, and, therefore, an increase of all its elementary parts has taken place. Whilst in the process generally called hypertrophy or chronic engorgement of the uterus, the connective tissue is chiefly affected; in genuine hypertrophy we chiefly find an increase of the muscular elements. The characteristics of such hypertrophied uteri have already been described.

It is evident that the intumescence of the uterus by this process is limited, and we cannot conceive a uterus remaining in this condition for any length of time without either destruction of tissue occurring, for every element is only enabled to receive nutritive material to a limited degree without impairment of its integrity; or without the occurrence of formative alterations leading to some of the affections already mentioned—diffuse or circumscribed proliferation of connective tissue, formation of polypi, or development of fibro-muscular tumours.

Genuine hypertrophy of the uterus is rare, being generally accompanied with and dependent on proportionate congestion. It occurs most frequently as a consequence of menstruation, the hypertrophic intumescence of the uterus continuing for some time after.

It generally affects the entire organ, but chiefly either the fundus, body, or vaginal portion.

In very rare cases numerical hypertrophy or *hyperplasia* of the uterus, may be demonstrated in the sense previously explained (see page 44). In such cases of genuine hyperplasia, as also in the enlarged uterus, the elements constituting a compound tissue must be present in normal proportion if we maintain the distinction between proliferation of connective tissue and uterine hyperplasia. The exciting cause must produce a uniform increase of formative action in *all* the elementary tissues of the uterus, which is rarely the case, this activity appearing to be much more excitable in the connective tissue in which it is aroused by the slightest irritation, whilst the latter is insufficient to produce any marked changes in the remaining tissues.

From this it is also evident that hyperplasia of the uterus, in the majority of cases, affects only the connective tissue, or, if the other tissues are affected, the former is predominately so; and consequently, by the affection usually called hypertrophy of the uterus, *diffuse proliferation of connective tissue* is meant. This incorrect denomination seems to have no further practical bearing.

The occurrence of genuine hyperplasia is, however, proven by those cases in which an unusually large uterus is found in women who have died in the puerperal state. It is true, facts should be adduced to prove, that the occasional development of muscular fibres, extraordinary in number and size, did not take place during pregnancy, which many considerations lead us to suppose. The contracted walls of such a uterus are sometimes two inches and more in thickness, and I may at

once mention, that sometimes spontaneous rupture of such enlarged uteri has occurred during labor.

For further details I must refer back to what has been mentioned on the subject of diffuse proliferation of connective tissue in the whole uterus or different portions of it.

4. ATROPHY OF THE UTERUS.

Literature: Morgani. De sedib. et caus. morbor. E. XXXIV. 11. XLVI. 20. XLVII. 2. — E. Kennedy, Dublin. Journ. 1833. Novbr. — John O'Brien, Schmidts Jahrb. 1841. pag. 48. — Meissner, Frauenzimmerkrankheiten. Leipzig. 1842. Bd. 1 pag. 172. — Kiwisch, Klin. Votr. 1845. pag. 99. — Chiari, Klinik der Geburtsh. u. Gynäcol. von Chiari, Braun u. Späth. Erlangen. 1852. pag. 271. — Scanzoni, Krankh. d. weibl. Sexualorg. 1856. pag. 63. — Rokitsansky, Path. Anat. Bd. III. pag. 454.

Atrophy of the uterus is an affection of mature age, and generally commences simultaneously with puerperal involution, or it must be considered as marastic degeneration of the organ. In chlorotic women also, a sort of atrophy of the uterus is sometimes met with, generally complicated with displacements, and derangements of menstruation. Besides these causes, atrophy may result from pressure or be due to mechanical causes.

As regards the degree or extent of this affection, we may distinguish between general and partial atrophy. The latter affects either the body, fundus, cervix or vaginal portion of the uterus.

Whilst we have recognized hyperplasia in its usual form as a proliferation of connective tissue, in atrophy chiefly the muscular substance of the uterus is affected, and the framework of connective tissue remaining intact, the character of atrophy is at once evident.

The substance of the uterus is therefore flaccid and soft, yet still of some resistancy. Only when the organ remains atrophied after puerperal involution, is its tissue friable and considerably

softened. Its walls are generally thin; and this condition increases the more its cavity is distended. Cases are even recorded in which the uterine walls were only of the thickness of paper (Hopfengärtner in Voigtel's work mentions Walter's *membranous uterus*).

As regards the cavity of the uterus a distinction has been made between *concentric* atrophy with diminution, and *eccentric* atrophy with dilatation of the cavity.

Marastic atrophy generally affects the whole uterus, the organ being smaller, frequently ante- or retroflexed, and sometimes has a granular rough feeling. In the appendages of the uterus, the course of the arteries is exceedingly tortuous, and the subperitoneal vessels, owing to their rigidity, are elevated above the serous membrane. Upon section we find the uterine tissue pale gray, or grayish-red. Upon the divided surfaces, the ends of the arteries, their walls being thickened and partly ossified, prominate as small whitish points with comparatively small orifices. The mucous membrane is loose, soft, dark-red, and frequently in an apoplectic condition, which latter sometimes extends deeply into the parenchyma; or it is sometimes dotted with a number of small vesicles; or, lastly, it is thin and reduced to a serous, glossy stratum of connective tissue.

Atrophy which sometimes follows the puerperal condition, consists chiefly of a derangement of puerperal formative action, the older muscular fibres, as usual in puerperal involution, being destroyed by fatty degeneration (Heschl), and restitution by new-formation not taking place; or it is caused by the destruction of the newly-formed muscular elements, by fatty degeneration from anomalies of nutrition of the system. In these cases the uterine tissue is of a grayish-yellow or yellowish-red color, and very friable, the torn surfaces being united by delicate mucous cobweb-like threads or filaments. This form of atrophy chiefly affects the body and fundus of the uterus. It is chiefly met with in cases in which a pathological

condition, especially tuberculosis, puts an end to life by sudden and extensive hæmorrhage after the puerperal condition. Chiari observed two cases of atrophy with complete cessation of menstruation, lactal secretion still continuing, and he considers them cases of premature senile atrophy.

Traction of the uterus causes a peculiar form of atrophy, the cervical portion being the part chiefly affected. It is thinned, its cavity diminished, especially at the internal orifice; the vaginal portion disappearing, and the vagina terminating in a point. I have already discussed these conditions under the head of so-called ELEVATION OF THE UTERUS.

The vaginal portion is either seemingly atrophied, in consequence of its elongation and elevation of the uterus, or absorption and retraction from lacerations during labor has occurred, analogous to that which affects the hymen after its rupture, and Rokitansky sometimes observed atrophy of this portion, due to some unknown cause, in young women at the time of puberty.

Apparent atrophy of the vaginal portion is also occasioned by adhesions between its external surface and the vagina. This adhesion sometimes affects only a part of its circumference, or is more considerable on part of its surface than on the rest; then the remaining normal portions encircle an orifice leading into a cavity formed by the anterior or posterior fornix, and which may even be entirely closed.

In the uteri of aged females, not unfrequently the entire vaginal portion has disappeared, leaving only small folds at the top of the fornix, which converge toward the cavity of the cervix.

Frequently atrophy of the uterus accompanies the development of fibroid tumours, and it may happen that in place of the uterus, an aggregate mass of round fibroids is found, between which you can scarcely detect traces of the uterine fibres. The cavity of the uterus has also either been entirely obliterated, or is merely represented by a small space

filled with gelatinous mucous, situated somewhere within the mass. The cervix uteri is either normal, or elongated and consequently thin. Sometimes, when calcified fibroid tumours exist, the uterus is atrophied to such a degree as to form a membranous organ, and consequently escapes observation, (cases which have been described as ossification of the whole uterus). Sometimes, in consequence of excessive distention of its cavity by accumulated mucus (hydrometra), a considerable thinning of the walls of the uterus from atrophy, is observable. The cavity of the *senile atrophied uterus* is often, independently of any atresia, found distended to the size of a filbert, and filled with a mucilaginous fluid, and this I consider to be true eccentric atrophy, caused by an accumulation of such fluid in consequence of deficient contractile power in the organ.

A peculiar atrophy, or rather *consumption*, affects the submucous stratum of the uterus, in consequence of enlargement of the follicles of the cervix and vaginal portion, or from excessive development of Nabothian vesicles, and I have already mentioned these conditions when speaking of the causes of flexions, and stated that this form of atrophy chiefly affected the tissue around the internal orifice.

Senile atrophy of the uterus occurs much earlier if the organ is affected with chronic catarrh; consequently we often find atrophy combined with mucons or cystic polypi, adhesion of the uterine walls, and the other consequences of uterine catarrh.

Finally, atrophy of the uterus frequently occurs after deliveries, in rapid succession, and in conjunction with atrophy of the ovaries.

Scanzoni also mentions as a cause of atrophy, imperfect innervation of the pelvic organs, consequent upon paralytic conditions of the system (paralysis of the lower half of the body, followed by amenorrhœa), and of which he observed several cases.

INFLAMMATION OF THE UTERUS.

Literature: Chr. G. Kiessling, De utero post-mortem inflammato. Lipsiæ 1754.—Cigna, uteri inflammatio. Dissert. Turin 1756, —Böttger, De inflammatione uteri. Rintel. 1760.—Morgagni. De sedib. et caus. morb. Ep. XX. 9., XXI. 29., XLVIII. 28.—Brotherson, Diss. de utero, et inflammatione ejusdem. Edinb. 1776.—J. C. Gebhard, De inflammatione uteri. Marburg 1786.—Plouguet, Diss. observ. hepatit. et metritid. etc. Tübingen 1794.—Voigtel, pathol. Anat. Halle 1805. —Wenzel, Ueber die Krankh. des Uterus, Mainz 1816.—Strehler. Ueber Entzündung der Gebärm. Würzburg 1826.—Guilbert, Consid. prat. sur cert. affections de l'utérus, en particulier sur la phlegmasie, etc. Paris 1826.—Duparcque, Traité théorique et prat. des malad. org. simpl. et canc. de l'utérus. Paris. 1832.—Lisfranc, Maladies de l'utérus et des ses adnex. Gaz. méd. de Paris. Nr. 61. 64. 73. 1833.—Mme Boivin et Dugés, Traité pratique, etc. Paris 1833.—Tom. II. pg. 198.—E. Kennedy, Hypertroph. and other Affect. of the neck of the uterus. Dublin Journ. 1838.—Lever. Prat. treat. on organ. diseas. of the uterus. London 1843.—pg. 13.—Rigby, Times. Septb. 1844. Juli 1845.—Kiwisch, Klin. Vortr. Prag 1845. I. pg. 477.—Robert. Bulet. de thérapie. Novr. 1846.—E. Kennedy Dublin Journ. Febr. 1847.—Oldham, Guy's Hospit. Reports. 1848. VI. 1.—Huguier. Mém. sur les engorgements de la matrice. Gaz. des Hôpit. 1849. 127.—Tilt, Lancet 1850. August.—Bennet, A pract. treatise on inflammation of the uterus and its appendages, and on ulceration and induration of the neck of the uterus. London 1853 3d. Edition.—Rigby, Med. Times and Gazette. Jan. 1856.—Mikschik, Zur akuten Gebärmutterentz. bei Ungeschwängerten. Zeitschr. der Ges. d. A. Wien 1855. Hft. 7. u. 8.—Scanzoni, Krankh. d. weibl. Sexual. Wien 1857.—Aran, Maladies de l'utérus Paris 1858.—Beccuere. Maladies de l'utérus. Paris 1860. Rokitsansky, Path. Anat. III. Bd. 1861.

The inflammatory processes to which the uterus is subject, affect either its *muscular substance*, its *mucous lining*, or its *peritoneal covering*. The latter will be discussed with anomalies of the uterine ligaments and peritoneum.

5. INFLAMMATION OF THE MUSCULAR SUBSTANCE OF THE UTERUS. METRITIS.

Inflammation of the substance of the non-gravid uterus seems to be one of the rarest affections to which this organ is

liable; and if some uterine pathologists doubt the existence of such a disease, and explain the cases diagnosed as metritis as cases of perimetritis, pathological anatomy, considering the small number of semi-authenticated post-mortem cases, must pronounce upon it with some reservation. I have not met with a single case, which, with any degree of certainty, I could pronounce to be one of genuine metritis, and I therefore borrow the following description from other authors.

In *acute parenchymatous metritis* the uterus, especially in its upper third, is found to be enlarged (even to the size of a goose's egg), thickened anteriorly and posteriorly, and reddish or bluish red, in some places more than others. The substance of its walls is very succulent, and marked with small extravasations, and a viscid fluid can be expressed from it, containing free nuclei and a small quantity of pus-corpuscles. In many cases its tissue may be so relaxed as to occasion larger extravasations with destruction of tissue. The mucous membrane of the fundus and body is vascular, reddened and softened; that of the cervix is generally normal. The vaginal portion is tumefied, œdematous and eroded, and the papillæ are sometimes distinctly prominent.

The most obvious alterations in the inner layers of the substance of the uterus, resulting from acute parenchymatous metritis, occur in that portion of the organ which contains the largest amount of connective tissue; the inflammatory action generally extends outward, giving rise to perimetritis and pelvic peritonitis, and is frequently combined with *encolpitis*, *metrosalpingitis* and *oophoritis*.

Acute parenchymatous metritis may terminate—*first*, in resolution with absorption of the exudation and a return of the uterus to its normal size; *second*, in consequence of the inflammatory action, proliferation of connective tissue may ensue, resulting in permanent enlargement or induration of the substance of the uterus; *third*, as it is incorrectly stated,

acute metritis may become chronic, and chronic engorgement be developed.

Kiwisch makes three distinct forms of parenchymatous metritis: *first*, metritis with œdema of the uterus, which according to his description may be considered as hyperæmia with intumescence from transudation; *second*, metritis with increased firmness of tissue, or acute *infarctus* of the uterus; and finally, *third*, hæmorrhagic metritis.*

A further termination of parenchymatous metritis is the extremely rare formation of an abscess in the substance of the uterus. Bartholin's observation (the uterus of a girl 13 years old, filled with ulcers) does not seem to belong to this class, but Reinmann (in Voigtel's work) describes an abscess of the uterus which opened externally through the abdominal walls. Scanzoni also observed one the size of a goose's egg, in the right circumference of the fundus uteri, which ruptured into the peritoneal cavity. Bird (*Lancet*, Feb. 1844) describes a case in which an abscess, situated in the posterior wall of the uterus, opened into the rectum.

The directions in which a uterine abscess may perforate, vary, of course, according to its situation; it may open inwardly into the uterine or vaginal cavity, or outwardly. If adhesions exist between the uterus and neighboring organs, the abscess may perforate externally through the anterior abdominal wall, or into the bladder, cæcum, ileum, and sigmoid flexure of the colon; or the pus may burrow between the folds of the broad ligaments into encysted portions of the abdominal

* Any one unprejudiced must be struck with the uncertainty of the great gynecologist in his description of metritis and his rather unsuccessful attempt at classifying it. His description of serous metritis is deficient of all anatomical requisites of inflammation; in "acute infarctus," an analogy to chronic infarctus was intended, which latter he was unwilling to drop; for he (Kiwisch) says, that the more acute the affection (that is, metritis with increased firmness of tissue) the more relaxed the uterine tissue is found. Finally, hæmorrhagic metritis is nothing else but acute uterine catarrh with hæmorrhage.

cavity (recto-uterine or vesico-uterine spaces); or lastly, it may pass directly into the peritoneal cavity, which latter occurrence is always followed by general peritonitis. A uterine abscess may also cause death from metastatic processes; or the long duration of the purulent secretion may exhaust the patient.

Acute parenchymatous metritis generally arises from acute catarrh of the uterus.

6. INFLAMMATION OF THE MUCOUS MEMBRANE OF THE UTERUS. ENDOMETRITIS.

Literature: Morgagni, *Desedib. et caus. morbor. Ep.* XX. 9., XLV. 21. 23, XLVIII. 11. — Raulin, *Traité des fleurs blanches.* 1766. — Denmann, *Medic. facts and observat.* London 1791. Vol. I. Nr. XII. pag. 108. — J. B. Blatin, *Du Catarrhe utérin ou des fleurs blanches.* Paris 1801. — Duparcque, *Traité theor. et prat. des malad. simpl. et canc. de l'utér.* Paris 1832. — Donné *Récherch. microscop. sur la nature du mucus et la manière des divers écoulemens des org. genit. urin. chez l'homme et la femme.* Paris 1837. — Montgomery, *An exposition of the signs and symptoms of pregnancy.* London 1837. pg. 147. — Nivet et Blatin, *Sitz und Urs. der Blasenpolypen.* Arch. gén. Octb. 1838. Schmidts Jahrb. 1839. — Durand-Fardel, *Mém. sur les blénorrhagies des femmes, etc.* Journ. des connoissanc. med. chir. 1840. Juli—Septb. — Churchill, *Diseases of females.* London 1844. pg. 102. — Copland, *Diction. of pract. Med.* II. 1844. — Kiwisch, *Klin. Vortr.* Prag. 1845. I. pg. 241. — Robert, *Bull. de Thérap.* Novbr. 1846. — Récamier, *Des granulations dans la cavité de l'utérus.* Annal de thérap. Août 1846. — J. G. Simpson, *On the nature of the membrane occasionally expelled in dysmenorrh.* Monthly Journ. Septm. 1846. — Oldham, *Membranous dysmenorrhœa.* London med. Gaz. Decemb. 1846. — W. Tyler Smith, *The Pathology and treatm. of Leucorrhœa.* Medic. chir. Transact. II. Ser. Vol. 17. 1852. — J. H. Bennet, *Practic. Treat. on inflammat. of the uterus* 3^e Edit. London 1853. — Nélaton, *Fongosités utérines, etc.* Gaz. des hôp. 1853. 17. — Förster, *Spec. path. Anat.* 1854. pg. 313. — Faure, *Mém. sur la dysmenorrhée,* Gaz. des Hôp. 1854. 49. — Chiari, *Klin. für Geburtsk. und Gynœc.* 3. Lief. Erlangen 1855. pg. 711. — Beigel, *Ueber die Secrete des Fluor albus.* Deutsche Klinik 1855. 19. — Kölliker und Scanzoni, *Das Secret der Schleimh. der Vagina und des Cervix.* Scanzon. Beitr. II.

Bd. 1855. — Virchow, in Gesammelt. Abhandl. Frankfurt 1856. pg. 850 u. 774. — E. Wagner, Zur normal. und patholog. Anatomie der Vaginalportion. Archiv f. physiolog. Heilkunde 1856. 4. — Scanzoni. Krankh. der weiblichen Sexualorg. Wien 1857. pag. 151. — Veit. Krankh. des weibl. Geschlechtsorg. Virchow's spec. Pathol. u. Therap. — Mayer, Versamml. der Naturf. und Aerzte zu Königsberg 1860. Monatschr. für Geburtsk. Berlin 1860. XVI. 5, und dessen klin. Mittheil. aus dem Gebiet der Gynäcol. Berlin 1861. — Rokitsky, Patholog. Anatom. III. Wien 1861. — Hennig, der Katarrh der inner. weibl. Geschlechtsorg. Leipzig 1862.

The inflammatory processes occurring in the non-gravid uterus are various, and we may distinguish as the chief forms of such processes, *catarrhal* and *croupy* inflammation. To this will add the anatomical description of the so-called *membranous dysmenorrhœa*, as I am persuaded that this morbid process is more an inflammatory derangement than any other. Catarrhal inflammation of the uterus, as elsewhere, is divided into the acute and chronic form.

7. ACUTE CATARRHAL INFLAMMATION OF THE UTERUS.

Acute catarrh (catarrhal endometritis) affects the whole mucous membrane of the uterus, but chiefly that of its body and fundus, whilst that of the cervix is rarely affected.

In this affection the mucous membrane of the body and fundus uteri may be so intensely injected as to appear dark-red, tumefied and velvet-like; the utricular glands, however, are not so much elongated as during menstrual fluxion; the membrane is also so softened that it may readily be removed, or scraped off with the handle of a scalpel. In the higher degrees of this disease small round striated extravasations are seen scattered over the mucous membrane as dark red spots.

The mucous membrane lining the cervix is more injected than swollen where it covers the turgid follicles; that of the vaginal portion of the uterus is generally of a darker red. In virgins the os uteri is transformed into a small round depres-

sion, owing to the tumefaction of the vaginal portion, the mucous follicles of its lips are enlarged, and frequently have small erosions between them, and the papillæ of the vaginal portion are visible to the naked eye, especially at the edges of the above-mentioned erosions.

The whole substance of the uterus generally appears to be increased, and its tissue more vascular and succulent, especially in the layers nearest the mucous membrane. The cervix, beyond increased succulence, hardly exhibits any change, while the vaginal portion is hyperæmic, tumefied and œdematous, and sometimes of a spongy softness.

At the outset of the inflammation, the mucous membrane of the body and fundus secretes a thin clear mucus, which, as the inflammation progresses, becomes viscid, thick, and turbid, from the admixture of desquamated epithelium. In regard to the latter, it is necessary to state that, in many cases the glandular utricular follicles cast off their entire cellular coverings, which latter are found in the mucus as collapsed casts. Nylander and Virchow have observed a similar expulsion of the whole contents of glands during menstruation, and I have repeatedly seen the same in various tumefactions of the uterine mucous membrane. Finally, the color of the secretion changes to yellow or yellowish, and from the admixture of purulent elements it becomes cream-like.

It is different with the secretion of the cervical portion; its glands at the outset of the inflammation undoubtedly secrete a larger quantity of, and a thicker mucus. Nabothian vesicles are developed, and the fluid contained in them presents the turbid cloudy appearance previously mentioned, finally becoming whitish or white. If the inflammatory process increases in intensity, the mucus becomes deliquescent, and on opening such a vesicle its entire contents flow out like water in which the cloudy turbescence appears in streaks. These vesicles, however, burst spontaneously, and the hypersecretion of the cervix becomes very fluid and finally purulent. In no

other secretion do we so frequently and distinctly observe a so-called *cellular halo* (cells having no investing membrane). Kölliker and Scanzoni also sometimes found a few fungi with round branches, similar to those seen in fermenting liquids, and isolated vibriones. I must not omit mentioning that the cells of the secretion are often disposed in rows like strings of beads.

Acute catarrhal endometritis rarely or never occurs before puberty; after that time, however, it is quite frequent. Duparcque states that, in females who have sexual intercourse, the mucous membrane of the cervical canal is always the first portion affected, and that from thence it spreads to that lining the body of the uterus.

As causes of this affection we find mentioned, colds taken during menstruation, excesses in drink and sexual intercourse, infection with gonorrhœal virus (virulent catarrh), and other diseases, such as typhus, dysentery, cholera, general tuberculosis and diseases of the heart (metastatic constitutional catarrh, Kiwisch).

Acute catarrh has a tendency to extend to the oviducts, and undoubtedly from them to the peritoneum; it also sometimes causes inflammation of the peritoneum independently of any such process in the oviducts. It may extend downward to the vagina, unless it has originated there and extended upward to the uterus. Acute parenchymatous metritis, as previously mentioned, may also arise from it.

Acute catarrh may terminate in resolution, but in the majority of cases it passes into the chronic form.

The so-called hydrorrhœa of pregnant females is considered by some to be catarrh of the gravid uterus, and it seems reasonable to suppose that a portion of the uterine mucous membrane, unlike the rest, may not be transformed into a decidua, and consequently give rise to increased transudation, from the hyperæmia connected with pregnancy.

8. CHRONIC CATARRH OF THE UTERUS.

Chronic catarrh of the uterus, a condition frequently met with, is characterized by a permanent irritation, often combined with considerable hypersecretion of the mucous membrane of the organ.

The mucous membrane of the body and fundus uteri is generally swollen, but not always highly congested, in the dead body; on the contrary, it is rather pale, and especially when considerably intumesced, of a bluish-gray color. We find scattered throughout it numerous dots or specks of pigment, generally gray or blackish-gray, but rarely of a rusty dark brown color. Its surface is either smooth, or papillary and uneven, the latter being especially the case at the posterior wall, which is sometimes covered with various secretions, and growths resembling granulations. The membrane is also generally softened and more succulent, but can seldom be separated from the uterine walls in as large pieces as in acute catarrh.

The mucous membrane of the cervix is likewise injected at various points and covered with viscid secretion, Nabothian vesicles are numerously developed and exceedingly distended, and the transverse folds are swollen and sometimes even œdematous. The vaginal portion is frequently enlarged, its tissue in a state of spongy relaxation, and its external surface affected with papillary hypertrophy. On its inner surface the swollen mucous follicles are prominent, and the external orifice is frequently dilated. In the majority of cases the latter is surrounded with excoriations and even granulating ulcers.

The secretion in some cases of chronic uterine catarrh is often very great (blennorrhœa), but in others it is slight; there is generally, however, a marked hypersecretion. The mucus secreted is turbid or even purulent to various degrees, but rarely mixed with blood (excepting shortly before or after menstruation). Scanzoni.

The uterine substance is either affected with a diffuse growth of connective tissue, in consequence of which it becomes denser and firmer, or it is flaccid and markedly atrophied. In the latter case, the cavity of the organ is often much distended, especially in those cases in which the cervical canal is occluded by the well-known glassy mucus.

When chronic catarrh is of long duration the mucous membrane, especially that of the body and fundus, undergoes important anatomical changes; its glands, either from constriction or atrophy of their superior portions, frequently change into small cysts, or are cast off, which latter occurrence, especially when the cavity of the uterus is distended, gives the mucous membrane a net-like appearance.

The ciliary epithelium which was cast off at the outset of the disease, has been replaced by cylindrical epithelium; this also is finally cast off, and *polymorphous lining cells*, which can hardly be called true basement epithelium, occupy its place. In some cases we also notice a desquamation of the epithelium, erosions, and small smooth-lined depressions, evidently formed by the rupture of small cysts. It is probably owing to this development and rupture of cysts that the delicate ridge-like elevations are formed, especially at the internal orifice, which give rise to adhesions.

While, as above mentioned, the epithelium is transformed, and the glands become atrophied, the mucous membrane also becomes thin, and is finally replaced by a delicate layer of connective tissue, which is covered by the polymorphous cells mentioned. More rarely we find the mucous membrane transformed into a callous stratum varying in thickness and attached to the submucous connective tissue, and in this stratum we find small cysts which are the remains of degenerated glands (Rokitansky).

More frequently the dense submucous stratum, especially at the borders of the internal orifice, becomes atrophied, and Nabothian vesicles are developed in it, thus causing a predisposition to flexion of the uterus.

The consequences of chronic uterine catarrh have already been described; they are: circumscribed proliferations of the mucous membrane, glandular and cystic polypi, and fibrous polypi when the submucous tissue has a tendency to proliferate; perhaps also fibroid tumours will be developed if the formative-action is sufficiently increased. After the development of such growths, their presence seems to occasion a constant irritation, thereby favoring the continuance of the chronic catarrh. Hydrometra and hæmatometra may also be developed in consequence of adhesions.

Chronic uterine catarrh generally proceeds from acute catarrh, and sometimes occurs in consequence of the puerperal state. It is also readily developed in cachectic women, and lastly, may be caused by the virus of gonorrhœa. In young women and prostitutes it is said to occur as a consequence of masturbation. It is said to extend down to the vagina and up to the oviducts, and in the latter case especially, it leads to serious consequences; sometimes, however, it originates in the vagina and spreads by continuity.

Uterine pathologists assert that chronic uterine catarrh is generally associated with derangements of menstruation, and that conception is not impossible, but rarely occurs when it exists. It is an interesting observation that females who have suffered for a long time from blennorrhœa have a predisposition to the occurrence of *placenta prævia*.

The frequency with which chronic catarrhal endometritis is complicated with chlorosis, scrofula, tuberculosis and diseases of the heart, is a fact universally admitted, and the profuse secretion and purulent discharge, contribute not a little to the complete exhaustion of the patient. In scrofulous and tuberculous girls, chronic uterine catarrh generally sets in at the period of puberty, and is combined with amenorrhœa. In such cases, the various proliferations of the mucous membrane rarely occur as a sequel to the catarrh, but the latter sometimes precedes tuberculosis of the uterus.

9. CROUPY INFLAMMATION OF THE UTERUS.

Croupy inflammation rarely affects the uterine mucous membrane. Sometimes in the vicinity of ulcerating carcinomata, a thin, fibrinous, pale-yellowish film is seen upon the softened mucous membrane, which is covered with small hæmorrhagic spots. Croupy endometritis occurs as a secondary affection in the course of typhus fever, cholera, eruptive fevers (scarlatina and small-pox), and especially with diphtheritic inflammation of the vagina (Rokitansky).

As an appendix to the inflammatory affections of the uterus, I mention the so-called *dysmenorrhœic membrane*.

Morgagni, Madame Lachapelle, Boivin and Dugès had already observed in dysmenorrhœa, the expulsion of peculiar membranes from the uterus, the striking resemblance of which to the *membrana decidua* had been remarked by P. Frank. Desormeaux, Churchill, Montgomery, Chéreau and others, considered these membranes as croupy exudations, until their true nature was demonstrated by Simpson, Oldham, and Virchow.

The membrane, which is generally covered with coagula when expelled in its integrity, is of a flattened and triangular shape, with two long borders and a short one; the posterior and anterior layers being united at their margins, the membrane consequently forms a sac. At its angles this triangular sac is open, and the borders of these openings have a ragged appearance. Its external surface is rough and felt-like, and perforated by numerous openings, some of which are larger than the puncture of a needle, and are also visible on the inner surface, giving the walls of the sac a sieve-like appearance. Its inner surface is smooth and of uniformly soft feeling.

It is now clearly demonstrated that this membrane is nothing more than the exfoliation of the whole mucous membrane of

the uterus during menstrual intumescence, for it is easy to detect in it, with the aid of the microscope, the characteristics of that membrane. Simpson recognized the above-mentioned perforations in the membrane as corresponding with the utricular glands, and found them to consist chiefly of nucleated cells; he therefore concluded that this membrane was nothing more than exfoliated hypertrophied mucous membrane. Virchow, even with the naked eye, noticed large blood vessels in these membranes.

Consequently, in this affection, the uterine mucous membrane is cast off as far as its matrix, and a sort of decidua is formed in consequence of a condition which Virchow calls "pregnancy on a small scale," and for which membranes he therefore proposed the name of *menstrual decidua*. According to Oldham, this membrane is formed between the menstrual periods, the process commencing with considerable congestion of the ovaries, which extends to the posterior wall of the uterus, and frequently occasions retroversion of the latter.

I have already stated that menstrual intumescence of the uterus differs very little from that accompanying acute catarrh. If therefore we are constrained to consider the process producing the menstrual decidua as an excess of menstrual phenomena, especially in the mucous membrane of the uterus, it follows, that those pathologists were not far from the truth, who described such cases as *endometritis*.

Finally, I must also mention those cases which Rokitansky suspects to be abortion during the first days of pregnancy although this connection is not clearly proven.

Membranous coagula, consisting of fibrin formed in the cavity of the uterus from extravasations, and moulded to the shape of the uterine cavity, are sometimes mistaken for menstrual decidua. Of course they are entirely destitute of organization, and not always of the peculiar sieve-like appearance.

10. ULCERATIONS OF THE UTERUS.

Literature: C. M. Clarke, *Observat. on the diseases of femal.* London 1821. II. pg. 185. Taf. 3. — Ricord, *Gaz. Méd. de Paris* 1833. Nr. 33. — Heyfelder, *Sanit. Ber. üb. d. Fürstenth. Sigmaringen* 1833-34., *Schmidts Jahrb.* 1835. VIII. — Lisfranc, *Gaz. méd. de Paris* 1834. Nr. 10 Mars. — Gibert, *des ulcérations du col de l'utérus.* etc. *Rév. méd.* 1838. Decbr. — Cruveilhier, *Anat. patholog.* Livr. 94. pl. 2., L. 37. pl. 2. — Otterburg, *Lettres sur les ulcérat. de la matrice.* Paris 1839. — Velpeau, *Sur les granulations du col de l'utérus.* *Gaz. des Hôpit.* 1844. 1. 9. — Récamier, *Journ. de Chirurgie* 1843. — Lever, *Practic. treatise on organic diseases of the uterus.* London 1843. pg. 145. — Kiwisch, *Klinisch. Vortr.* Prag 1845. I pg. 466. — E. Kennedy, *Dublin quarterly Journ.* 1847. Febr. — Robert, *Des affect. granul. ulcér et carcinom. de l'utérus.* Thèse. Paris 1848. — Ashwell, *A practic. treatise on the diseas. peculiar to women.* London 1848. Deutsch v. Hölder. pg. 408. — Simpson, *Inflammat. eruptions upon the mucous membr. of the cervix uteri.* *Monthly Journ.* 1850. April 1851. Juli. — West, *Ueber die patholog. Bedeut. der Ulcerat. des Muttermundes.* London 1854. Mitgeth. von Hecker, *Monatschr. f. Geburtsk. etc.* Berlin 1854. IV. 2. — Förster, *Spec. Patholog. Anat.* 1854. pg. 317. — Simpson, *Obstetric mem. and contrib.* Edinburgh. 1855. Vol. I. — Scanzoni, *Krankh. d. weibl. Sexual.* Wein 1857. pg. 171. — Meyer, *Vers. d. Naturf. und Aerzte zu Königsberg* 1860. *Monatschr. f. Geburtsk. etc.* Berlin 1860, XVI. 5. — Rokitsansky, *Path. Anatom.* III. pg. 478. 1861.

Ulcerations of the uterus, with the exception of those resulting from abscesses, tuberculosis and carcinoma, are limited to the vaginal portion, and, in very rare cases, only extend to the lower portion of the cervical canal.

Uterine pathologists make a distinction between the simple erosion, the simple granulating, the fungous granulating, the varicose, the follicular, the phagedenic, and the syphilitic ulcer, and the more frequent observation of such in the living than in the dead body, does not authorize pathological anatomists to alter this classification.

An erosion consists simply of a loss of the epithelium covering the vaginal portion. The denuded surface is very

moist, its borders generally well defined, its form circular, and its size varying; its centre is smooth, intensely reddened, and moist, and marked with small dark-red spots. Upon a closer examination you perceive that the latter correspond with the mucous papillæ, the hyperæmic extremities of the blood vessels of which form these dark-red discolorations. Single erosions frequently become confluent, in consequence of which their circular form is altered to a sinuous, irregular one, and frequently they form a circle around the external orifice. The borders of these erosions are either of a rose-color, nearly like normal tissue, or are altered by the coexistence of acute catarrh. When combined with luxuriant epithelial growth, their circumference is pale, and even milky white, as for instance, with coexisting prolapsus of the uterus.

Erosions are generally accompanied with acute or chronic catarrh of the uterus or vagina, and are caused either by this or other forms of intumescence of the mucous membrane. Syphilitic erosions have also been described; but I agree with Scanzoni, that they have no distinguishing characteristics from the non-syphilitic, and that erosions occurring on the uteri of syphilitic women, must simply be attributed to catarrh, which is rarely absent. I would further state that the rarity of true syphilitic ulceration of the vaginal portion of the uterus seems to contradict the assumption of syphilitic erosions in this locality.

Strictly speaking, an erosion is the first stage of ulceration, and from an examination of it, we will be unable to say whether it will continue as such, or whether it will pass into one or other of the forms of ulceration. Erosions have also been described under the name of *phlyctenæ of the os* (Lisfranc).

Scanzoni likewise observed the so-called *aphthous* form of erosions of the external orifice, and considers them identical with the *herpetic* forms described by Lisfranc, Robert, and others. In these latter forms the epithelium of the vaginal

portion appears elevated in small vesicles, which finally bursting, leave an eroded surface. From an anatomical point of view, two forms of erosions may be distinguished; either the epithelium of the vaginal portion is softened at certain points by the acrid catarrhal secretion, or an exudation within the tissue of the vaginal portion raises the epithelial covering in the form of small vesicles, or large ones from confluence. The latter form would seem to represent the herpetic eruptions. The form described by Scanzoni does not bear sufficient resemblance to diphtheria to authorize us to use the term *aphthous erosions*.

The herpetic eruption frequently occurs in consequence of dyscrasia. The bases of the erosions are covered with a thin layer of the germinating stratum of the epithelium, and secrete a thin transparent fluid.

Here it is well to mention the observations of Joulin (Gaz. des Hôp. 1861. No. 40.) and C. Braun, (Med. Jahrbücher, Wien. 1861), relating to *pemphigus* of the cervix uteri. The former met with circular bullæ with regular margins, which appeared like large drops of thick viscid mucus hanging from the cervix, and generally surrounded at their bases by a red circle. C. Braun observed in a pregnant female, affected with hypertrophy of the papillary body of the vagina, numerous elastic bullæ as large as peas, which covered the whole vaginal portion and the posterior fornix.

The ulcerations proper of the vaginal portion originate from erosions. The loss of substance in an ulceration is characterized by its greater depression, as also by profuse purulent secretion from its surface and an early tendency to granulate.

Granulations of the vaginal portion are distinguished by their vascularity, and their sometimes excessive luxuriance, in consequence of which they frequently form large tumours. They are generally developed from the papillæ of the vaginal portion, and grow either from isolated portions of the border of the ulcer, or from its base, in the form of soft, strawberry or

raspberry-like, dark-red tumours, which bleed excessively on the slightest touch. Velpeau made a striking comparison between these granulations and those of granular conjunctivitis. A more excessive development of these granulations characterizes the so-called *fungous ulcer*. Granulating ulcers rarely exist independently, but are generally combined with chronic uterine affections. When present, the external orifice is generally patulous, and its lips have a soft, spongy sensation. Velpeau states, that he found them in two-thirds of the females affected with leucorrhœa. They are of rare occurrence before puberty, and not less so in aged females, but are most frequent between the ages of eighteen and thirty-six years. They are said to occur frequently in scrofulous individuals. Sometimes they extend into the cervical canal.

Lee states that he never saw an ulceration of the os, either in a living or dead woman, that was not due to some constitutional disease.

Robert asserts that granulations are not always developed from ulcerated surfaces, but may arise from direct proliferation of the papillæ of the mucous membrane of the vaginal portion.

When exuberant granulations attain a considerable development, the shape of the mass is changed by the pressure of the walls of the vagina. Kennedy called ulcers covered with such granulations *cock's-comb ulcers*, and the more simple, small, and readily-bleeding ones, *bleeding ulcers*.

Under the name of *ulcerated fissures* or *linear ulcers*, we find described those frequent, extensive, and deeply-penetrating ulcerations which result from lacerations occurring during labor.

Frequently the mucous follicles of the vaginal portion become swollen, giving a granular appearance to its mucous membrane, which circumstance has probably induced Chomel to regard granulations of the vaginal portion as diseased or hypertrophied follicles.

Many gynecologists also make *varicose ulcers* another distinct class. Upon the livid, blue mucous membrane of the swollen vaginal portion, numerous and distinct varicose venous plexuses are said to be visible; the mucous membrane covering them becoming softened, gives rise to erosions, the bases of which appear bluish-red, and beneath which the underlying venous plexuses may be seen. Scanzoni observed in such an erosion a vein as large as the quill of a raven's feather, and from which he evacuated two ounces of blood. Récamier observed similar destructions of tissue, with granulations growing from them which he compared to hæmorrhoidal tumours.

In scorbutic females, the borders of such ulcerations are of a bluish-gray color, their bases dark bluish-red, and the tissue around them ecchymosed.

Follicular ulceration of the vaginal portion I have never observed in the dead body. It occurs in consequence of the formation of pus in a follicle, which swells, finally points, and bursts. Follicular ulcers are circular, varying in size from a hemp-seed to a pea, and have smooth, clear bases. They are said to heal readily.

The *phagedenic ulcer* of Clarke, or corroding ulcer of the os uteri, seems to be an extremely rare form of ulceration, and was first described by Clarke, Lever, and Baillie. All German gynecologists incline toward the opinion, that under this name ulcerative carcinomata were described by English authors. But Rokitansky and Förster observed such ulcers which undoubtedly had no cancerous origin, which fact is sufficient to prove the existence of such an ulcer. It generally commences at the vaginal portion, penetrating deeper and deeper into its substance, which is always affected with profuse proliferation of connective tissue. The form of the ulcer is sinuous, irregular and angular, its base villous, and of a greenish-black color, and its borders indurated. At the same time there is a gelatinous proliferation of connective tissue, the vaginal portion, and finally the cervix, being completely destroyed by it. Ro-

kitansky calls attention to the resemblance between this ulcer and ulcerating lupus, and Förster declares the process to be ulceration, with gangrenous destruction of tissue. In some cases the bladder and rectum have become involved in the ulcerative destruction. This ulcer bleeds very readily, secretes a thin, nauseous, ichorous fluid, mixed with gangrenous tissue, and terminates fatally from exhaustion. No cases of this kind have come under my notice, and those described by English authors as *corroding ulcers* are not quite so well authenticated as those mentioned by our German anatomists. This ulcer is said to occur, without known cause, only in advanced age.

The syphilitic ulcer, or chancre of the vaginal portion, is rarely met with, and is distinguished by its circular or roundish form, its sharp, well-defined border, and its exquisite *lardaceous* base. Ricord found it more frequently on the anterior than posterior lip of the vaginal portion. In rare cases the ulcer extends to the mucous membrane of the cervix, but generally it is limited to the vaginal portion. Arising as simple erosions, they may become deep ulcers, perforating even the bladder and rectum (Förster). Usually such a chancre is combined with intense blennorrhœa, or similar affections of the vagina. The healing of the ulcer commences by the formation of a cicatrix, with considerable contraction.

Kiwisch and Förster also mention syphilitic erosions as the primary stage of syphilitic ulcers. If common erosions in these parts heal without cicatrization, as in other parts of the body (and syphilitic ulcers never heal without it), then the small radiating cicatrices, which are not unfrequently seen upon the vaginal portion, may perhaps be referred to healed syphilitic ulcers.

Cicatrices resulting from the healing of syphilitic ulcers in the cervix, may lead to stenosis and even atresia, of its canal, and Förster thinks, that at the internal orifice they may produce slight flexion of the uterus.

WOUNDS AND RUPTURES OF THE UTERUS.

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23. Juni 1859. — Virchow, Monatschr. f. Geburtsk. etc. Berlin 1860. Bd. XV. pg. 176. — Rokitansky, Path. Anatom. III. pg. 476. 1861. — Klob, Anat. Studien über Perimetritis, Wittelshöfer med. Wochenschrift. Wien. 1862. Nr. 48. 49.

Ruptures of the uterus may occur either independently of, or during pregnancy, but most frequently happen during labor.

The non-gravid uterus can only be ruptured when its cavity has been considerably distended, either by the accumulation of different fluids, or by adventitious growths without increased hypertrophy of its walls. Rupture of such a uterus will most likely occur when the accumulated liquids or distending growths rapidly increase. If the uterine cavity contain ichorous fluid or pus, its inner surface is generally ulcerated, and rupture can therefore more readily occur. The same applies to ulcerative carcinomata, which may produce loss of substance or degeneration of the uterine walls.

Fibroid tumours, by their considerable growth in a very short period, frequently cause rupture. Kiwisch, even in the presence of small fibroid tumours, observed partial fissures and penetrating ulcerations of the uterus.

Perforation of the uterus by abscesses has already been mentioned.

Without distension of the cavity of the uterus, and a certain tension of its walls, even violent mechanical concussions will hardly produce rupture. In women who have fallen from a considerable height, and whose pelves were completely fractured, I have never seen rupture of the uterus, even when the latter was considerably enlarged by menstrual congestion. But if its cavity is distended, and its walls stretched, a blow on the abdomen, a fall, or even violent bodily exertion, will often cause rupture.

The natural consequence of rupture of the *non-gravid uterus* is, more or less considerable, or even fatal hæmorrhage into the peritoneal cavity. If death does not take place directly from this cause, any fluid which may have been in the uterus

passes into the peritoneal cavity, and if of an irritating character (decomposing blood, pus, or ichor), general peritonitis may ensue, unless the fluid is shut off from the peritoneal cavity by adhesions between neighboring organs, or, as happens in rare cases, if the rupture takes place into the adherent bladder.

In the most favorable cases, however, metritis and perimetritis will commence at the point of rupture, and ultimately cause its cicatrization.

Ruptures of the *pregnant uterus* are of much more importance. They are liable to occur, as it appears, during any month of pregnancy, although Duparcque never observed a case before the second month. They certainly happen less frequently during the first half of pregnancy. The most common causes of rupture of the pregnant uterus are *deficiency of substance* from arrested development, and *displacements* (retroflexion).

The so-called interstitial pregnancies generally terminate fatally before the fourth month, from rupture of the uterus. Among the other causes of rupture during pregnancy, we must mention affections of the tissue of the uterus, causing partial thinning of its walls, also fibroid tumours and carcinoma.

During pregnancy, especially at its commencement, only the body and fundus of the uterus are distended, the cervix participating in the enlargement at a later period. If the stretched uterine walls then contract violently, rupture will more readily occur, as the cervix remains contracted and inelastic (Kiwisch). Finally, the mechanical causes of rupture must be mentioned, which will produce the same effect as if the non-gravid uterus was distended, as previously mentioned.

Rupture of the uterus always occurs at its body or fundus, sometimes near the internal orifice; in interstitial pregnancy, near the orifices of the oviducts. Sometimes the seat of the placenta is the point of rupture.

Rupture of the uterus is either *complete* or *incomplete*. In

complete rupture the foetus may escape into the peritoneal cavity without rupture of its investing membranes. If death does not ensue from profuse hæmorrhage, peritonitis, excited by the death of the foetus, may supervene, or a fatal termination may take place from metritis or metro-lymphangitis, commencing at the place of rupture.

In very rare cases the expelled foetus is transformed into a *lithopædion*, the fissure in the uterus being closed by cicatrization.

The most frequent ruptures of the uterus are those happening during labor. They occur either spontaneously or mechanically. The causes of spontaneous ruptures lie in the uterus itself, or in its vicinity, especially in the pelvis, or they are due to anomalies of the foetus.

To the former belong strictures and rigidity of the external orifice, atresia, tumours of the vaginal portion, and inequality of contractions from a yielding of the thinned uterine walls. The latter is chiefly occasioned by the pressure of foetal parts during labors with unfavorable presentations (Kiwisch).

Relaxation of the uterus, in consequence of previous deliveries, would also seem to be a cause of rupture. However, we must also mention circumscribed metritis and fatty degeneration of the muscular tissue of the uterus. In several cases of spontaneous rupture I have observed fatty degeneration of the muscular tissue at the point of rupture. This was also observed by Lehmann in his case. Another remarkable circumstance in some cases of rupture is an extraordinary thickness of the uterine walls, or hyperplasia of the uterus (C. Braun), causing extreme disproportion between the body, fundus and cervix. Fibroid tumours involving part of the uterine walls and thereby causing unequal contractions, and carcinomata, which from pressure, render the uterine tissue more friable, or cause a direct loss of substance, may also cause rupture during the contractions of labor. In some very

rare cases rupture was observed to take place after a successful cæsarian operation, in consequence of rupture of the cicatrix. Cases are also known in which rupture has occurred laterally to the cicatrix, owing, probably, to the age of the latter. Finally, I must mention proliferation of connective tissue in the external layers of the uterus, which, according to my experience, occurs as a sequel to perimetritis, and is frequently noticed in ruptured uteri, although I am unable to explain the effect of this condition in producing rupture. [This subject will be entered into more minutely under the head of PERIMETRITIS.]

In the second class of causes (mechanical) of rupture, we place tumours, which arising from the appendages of the uterus or from the pelvis, narrow the pelvic outlet, and consequently cause excessive but ineffectual uterine contractions. The pelvis itself may occasion rupture, owing to some anomaly of its shape. In general, the narrow pelvis comes under this head; but especially an unusual prominence of the promontory of the sacrum, and of the linea ileo-pectinea (Murphy, Burns) are considered causes of rupture. By excessive prominence of the promontory, the uterus may be perforated by being pressed upon it, especially if the margin of the fifth lumbar vertebra and the base of the sacrum form an angular prominence, as is frequently the case in greatly inclined pelves.

With regard to the foetus, its size, especially that of its head (consequently hydrocephalus), has been considered a cause of uterine rupture. In regard to this I must mention the fact observed by obstetricians, that ruptures of the uterus occur much more frequently during the birth of boys than of girls. Simpson, in thirty-four cases of spontaneous rupture of the uterus, notes twenty-three births of boys, and only eleven of girls; Collins, in fifty-four cases, thirty-eight of boys; and Burns counts three-fourths of the cases of uterine rupture as happening during the birth of boys. Further, it is known that spontaneous rupture of the uterus is more frequent in

multiparæ than primiparæ. In twenty-eight cases observed by myself, only five were in primiparæ; in one, rupture occurred at the nineteenth birth, in two at the tenth, and in two others at the ninth. Trask (American Journal of Medical Science, 1848) computed three hundred cases, which showed that age was of considerable importance.

There were under	20 years	3 cases.
“ “ from 20—25	“	14 “
“ “ “ 25—30	“	34 “
“ “ “ 30—35	“	36 “
“ “ “ 35—40	“	37 “
“ “ “ 40—45	“	15 “

As regards the number of pregnancies :

In 1st pregnancies	there were	24 cases of rupture.
“ 2d	“	18 “
“ 3d	“	17 “
“ 4th	“	21 “
“ 5th	“	18 “
“ 6th	“	16 “
“ 7th	“	9 “
“ 8th	“	5 “
“ 9th	“	5 “
“ 10th	“	9 “
“ 11th	“	8 “
“ 12th	“	3 “
“ 13th	“	2 “

Ruptures of the uterus are divided into penetrating or *complete*, and non-penetrating or *incomplete*.

In almost every labor, however normal, the vaginal portion is fissured in one or more places; but these fissures are not classed with pathological ruptures. A fissure of the vaginal portion sometimes extends to a varying height into the cervix, even as far as the internal orifice, and involves the uterine tissue in varying degrees. The upper end of a fissure rarely extends deeper than the innermost layer of the cervix, while inferiorly the entire thickness of the vaginal portion is ruptured, hence the triangular form of the fissure, that is, the lower edges of the fissure are much more widely separated than the upper,

all the transverse fibres of the cervix at the former point being completely divided.

Frequently a few fibres of uterine tissue remain intact at the upper portion of the fissure, extending from one edge to the other, and bridging across it. The rupture evidently begins within and extends outward, and the inner layers of tissue are generally ruptured higher up than the outer ones.

It is more rare for such ruptures to extend above the internal orifice into the body of the uterus, and I can remember only one case in which a fissure extended along the posterior wall of the uterus nearly as far as the orifice of the right oviduct. On the other hand, those fissures previously mentioned, to which the pregnant uterus is liable, occur exactly in its body and fundus. In extremely rare cases, a transverse fissure occurs, or the latter is combined with a longitudinal one, thus forming a kind of flap. I have met with two such cases in which the ruptures extended longitudinally through the whole cervix, uniting with transverse fissures at the upper portion of the latter, so as to form an angular rupture. Those cases are remarkable in which the body of the uterus is completely separated from the cervix, or the entire organ from the vagina. Cook describes such an occurrence in an inverted uterus.

Bluff states that fissures occur more frequently on the left side of the uterus (whilst Stein found the contrary), the head of the foetus presenting more frequently toward the left than the right. In cases known to myself, it was not apparent that ruptures were more frequent on one side than on the other.

Under peculiarly unfavorable circumstances, the fissure extends downward, and is combined with various, and even considerable ruptures of the vagina. On the other hand, the bladder, or even the rectum, may be involved in the rupture. Still, I believe both the latter accidents only occur when the uterus is forcibly ruptured, as in a case I remember testifying to before the courts.

In regard to complete ruptures of uterine tissue, it must be

remarked, that sometimes they extend to the peritoneum without tearing through it, which circumstance is accountable to the great elasticity of that membrane. Not unfrequently, however, I found the peritoneum in a peculiar condition from traction, blood oozing from a number of small openings which had been formed here and there, in consequence of a separation of its fibres. Considering the very great stretching which the sub-peritoneal tissue undergoes during pregnancy, it is easily conceived that it will possess so little resistancy that an extravasation may undermine or separate the peritoneum to a great distance from the point of rupture, even to the iliac bone, and further up along the vertebral column. The same may be said of the submucous connective tissue of the pelvic cavity, which is frequently found to be dark-red from extravasated blood, and considerably relaxed. The extravasation may even extend downward to the labia, causing a bluish-red tumefaction.

We must make a distinction between ruptures and contusions of the uterus. Contusions are apt to occur when prominent hard foetal parts press against projecting portions of the pelvis, thereby compressing the intermediate tissue. In a normal pelvis these points are chiefly the symphysis pubis, and the promontory of the sacrum, in the triangular pelvis, the horizontal rami of the pubis, and exostoses which may happen to exist. With regard to the symphysis, Professor Krassnig called my attention to the frequent posterior prominence of the cartilage of the symphysis, which fact deserves particular attention. Corresponding to the above points, penetrating contusions sometimes occur in the anterior or posterior uterine wall. I have also observed and already mentioned a case of transverse rupture of the posterior lip of the vaginal portion.

If ruptures of the uterus do not cause death by profuse hæmorrhage, metritis, endometritis, metro-lymphangitis, and gangrene frequently arise from the point of rupture, or follow extravasation ; or, an ichorous process, combined with throm-

bosis and metastatic affections, finally terminates life. Gangrene and the ichorous process are rendered more acute and exhausting if rupture of the bladder exists. Extensive peritonitis almost always follows rupture.

Rokitansky mentions, that sometimes the uterine artery is denuded by gangrenous sloughing, and finally becomes the source of fatal hæmorrhage. In rare cases, even considerable ruptures will heal, the hæmorrhage being arrested by contraction of the uterus immediately after the rupture has occurred, and by a uniting of the edges of the wound by granulations. If the rupture extends up to the body, a portion, or even the whole extent of it may remain open, and only become closed by an adhesion of the edges of the wound to the abdominal wall (Rokitansk y).

A singular fact, deserving particular mention, is the rare occurrence of spontaneous ruptures in primiparæ, from which fact several of the mentioned causes of rupture are diminished in importance. Thus I find mentioned in DeLanghes' case, that three times healthy children were born, and, at the birth of the fourth, rupture occurred, which was attributed to an antero-posterior diameter measuring only three and a half inches. Murphy relates a similar case occurring at the fifth, and Rooke one at the fourth delivery. The former, however, expressly states, that ruptures never occur when the texture of the uterus is in normal condition, not even when the pelvis is contracted. Lehmann, in like manner, in his case, notwithstanding a contracted pelvis, attributes the rupture to fatty degeneration of the uterine tissue at the point of rupture.

Clarke and Collins observed a case in which the peritoneum only was ruptured near the fundus during labor, and death occurred from internal hæmorrhage.

Rupture of the uterus always appears considerably less in the dead body, owing to the uterus contracting considerably after death.

In regard to the healing of wounds of the uterus, we possess

but little reliable data. The manner in which the wounds from Cæsarian operations heal, possesses considerable interest.

The following is what may be gathered from the few cases recorded of this operation. The healing generally takes place by removal of the uterus from contact with the abdominal walls by its contraction, and healing of the wound by cicatrization. The cicatrix is always very considerable, and frequently radiates into the uterine tissue. In the cicatricial tissue, round calcareous masses are sometimes found, resembling those met with in fibroid tumours. The detailed account of a case published by Lange (report of post-mortem by Professor Dlauhy), differs somewhat from the above, the fundus uteri lying immediately below the pubis, having displaced the bladder upward and to the right, and become adherent to the anterior abdominal wall by a cone formed of a whitish dense tissue. Externally, the point of attachment corresponded to a grooved indentation. The cone mentioned inclosed a funnel-shaped eversion of the uterine cavity communicating with the latter, and was lined with mucous membrane as far as its apex. Lange is of the opinion that the wound of the uterus, resulting from Cæsarian section, is never closed otherwise than by a plastic exudation from the inflamed peritoneum, but it is difficult to understand why this should be laid down as a rule, as ruptures of the uterus, possessing less favorable conditions for healing, may become perfectly closed without peritonitis having existed. The mode of healing in Lange's case is, however, very interesting and in accordance with the theory of Rokitansky, according to which, ruptures of the uterus are only perfectly closed through the intervention of the abdominal walls. As previously mentioned, the cicatrix resulting from Cæsarian section, may be ruptured by successive pregnancies, still, cases are known in which this has not occurred, as well as other cases in which rupture occurred laterally to such a cicatrix.

B. QUALITATIVE DERANGEMENTS OF NUTRITION.

Fatty and amyloid degeneration of the uterus must be considered as results of qualitative alterations of nutrition, and it is necessary to state that both these metamorphoses affect chiefly the muscular tissue of the uterus, whilst the connective tissue only slightly participates in such changes. The cause of this is probably owing to a higher degree of vulnerability of the muscular elements of the uterus as compared with the connective tissue.

1. FATTY DEGENERATION OF THE UTERUS.

Literature: Andral, Précis d'anatom. patholog. Bruxelles 1837. II. pg. 237.—Bureau, Weisse Erweichung des Uterus in Folge der Entbindung. Froriep's Notizen Nr. 631. 1844. — Heschl, Untersuchungen über das Verhalten des menschl. Uterus nach der Geburt. Zeitschr. der Ges. d. Aerzte. Wien 1852. 9. pg. 228.—Simps on, Monthly Journal. J. August 1852. — Kölliker, Microscop. Anatomie etc. Leipzig 1852. II. 2. pg. 451. — Rokitsk y, Pathol. Anat. Wien 1861. III. pg. 498. u. 510.

Fatty degeneration, as mentioned above, affects chiefly the muscular fibres of the body and fundus of the uterus, whilst those of the cervix are generally not thus affected.

We can usually distinguish two varieties of fatty degeneration; the one is always to be traced to previous labor, and according to our classification belongs to anomalies of *post-puerperal formation* which was demonstrated by Heschl and Kölliker; the other variety does not depend upon the puerperal condition, but is the consequence of morbid affections of the uterine arteries, and therefore depends on *ischæmia*.

The most frequent affection of the uterine arteries is senile rigidity in consequence of hyperplasia of their inner and

outer coats, and by which finally the channel of the vessels is diminished and even closed. Under the effects of the consequently deranged nutrition, the muscular fibres are transformed into fat, and finally are absorbed. As a final result of this anomaly, we find the uterus reduced to a flaccid organ, composed essentially of connective tissue, and usually in an abnormal position, the firmness of its tissue having been considerably diminished. This affection, therefore, coincides with senile atrophy, the characteristics of which it represents; at the same time the mucous membrane varies in color between dark-red and black, the uterus is small, flaccid and friable, its body and fundus thin-walled, whilst its cervix maintains nearly its normal resistance and thickness.

Fatty degeneration of the uterine muscular tissue also occurs in tuberculosis of the uterus, and I am inclined to explain this in the same manner as senile degeneration, the blood vessels in this disease also being affected with proliferation of nuclei and diminution of calibre (Wedl), resulting in ischæmia and fatty degeneration of the muscular tissue.

For the same reason, fatty degeneration of the uterus would be likely to occur as a consequence of embolus of the uterine arteries; but this, to my knowledge, has never been observed.

Fatty degeneration generally commences in the innermost layers of the uterine substance, and gradually extends outward. It is generally combined with shriveling of the ovaries, and atrophy of the oviducts.

Post-puerperal fatty degeneration will be considered in the next chapter.

2. AMYLOID DEGENERATION OF THE UTERUS.

Literature: R. Virchow, *Neue Beobachtungen Ueber amyloide Degeneration*, in his *Archiv*. Bd. XI. pg. 188. 1857.

The only case of this affection known at the present time is recorded by Virchow. It was taken from an elderly woman

in whom also amyloid degenerations were found in both kidneys, the spleen, liver, intestines, heart, lungs, and even the nerves. The uterus, the anterior and posterior walls of which were enlarged, was of a peculiar yellowish-gray and transparent appearance, and a micro-chemical examination showed, that the thick bundles of smooth muscular fibres were undergoing complete amyloid degeneration, while the thick-walled blood vessels and the intervening connective tissues showed no chemical reaction.

Virchow therefore thought, that amyloid degeneration should be distinguished as a separate affection from so-called hypertrophy of the uterus; but the former seems to be an exceedingly rare affection. In one case only, a woman fifty-eight years old, I noticed that the enlarged uterus was of a peculiar pale-grayish color, its muscular fibres being enlarged and peculiarly glossy; upon the application of iodine and sulphuric acid the smallest uterine arteries assumed a distinct blue color, whilst the muscular fibres showed no such reaction. The blood vessels of the kidneys from the same subject, however, as well as those of the liver, exhibited a similar reaction in a lesser degree, but still sufficient to be recognizable. The woman had died of apoplexy of the brain. Friedreich, in one instance, also found the blood vessels of the uterus affected with amyloid degeneration, combined with the same affection in other organs (Virchow's Archiv., XIII., p. 498).

PUERPERAL AFFECTIONS OF THE UTERUS.

From the moment of conception and fixation of the ovum in the uterus, a powerful energy of nutritive and formative action is aroused, the result of which we term DEVELOPMENT OF THE PREGNANT UTERUS. This development, in the majority of cases, is probably induced by the changes belonging to the last menstruation continuing in the form of permanent hyperæmia, and reaching their climax during the development of the foetus.

Under the influence of pregnancy the uterus increases in size, whilst at the same time the whole organ gradually sinks somewhat into the pelvic cavity, until the spherical enlargement of its body and fundus causes it to gradually ascend again into the abdominal cavity.

The occurrence of anteflexion or anteversion during pregnancy, as mentioned by some authors, is a mere illusion. The anterior wall of the uterus distends at an early period, assuming a rounded form, which produces a sort of flexion at the anterior circumference of the internal orifice, without a corresponding curvature at the posterior circumference. The descent of the uterus, observed by all authors during the first months of pregnancy, in itself contradicts the possibility of anteversion.

The uterus increases in substance beyond the first half of pregnancy, which increase is owing to a simple and numerical hypertrophy of its muscular fibres, the uterine tissue at the

same time becoming softer and more succulent. These changes chiefly affect the body and fundus of the uterus, its cervix participating only slightly in them. During the latter period of pregnancy the cervix participates in the enlargement of the uterine cavity, the internal orifice is dilated, the cervical canal becomes funnel-shaped, with its larger opening upward, and finally shortens, and the vaginal portion, forming an inactive valve, represents the narrowest portion of the genital canal. It is of the greatest importance to the physiological process of labor, that the least contractile portion of the uterus encloses those parts of the foetus which occupy the lowest position.

The most important alterations are those which take place in the mucous membrane of the body and fundus in the development of the decidua.

The arteries of the uterus become considerably distended and the veins still more so. The dilatation of the latter is most considerable at the point of placental attachment, at which place they appear like exceedingly thin-walled sinuous canals, the size of a finger, the intervening walls of which have probably ruptured at certain points, causing the innermost layers of uterine tissue at the seat of placental attachment to be replaced by a vascular tissue with large cavities, which, when the latter are filled, projects somewhat inwardly, and has been termed the "*maternal placenta*."

During pregnancy, beneath the distended mucous membrane, which has become transformed into a decidua, a sort of rete Malpighi is developed, consisting of a loose, succulent, very thin stratum of chiefly young cells, which probably cause the decidua to be so easily separated.

The question has again and again come up as to whether, during labor, the mucous membrane which is transformed into a decidua, is cast off, and consequently, whether the entire inner surface of the uterus should be considered a raw surface, or whether the decidua remains attached, and returns to the condition of a mucous membrane? If the former is

the case, the mucous membrane must be formed anew. If the latter, only the point of placental attachment must be considered a denuded surface. In regard to this, Rokitansky states that "in the normal puerperal process, at least a layer of the decidua remains, which, from the condition of a soft, succulent, wide-meshed structure, returns to that of the uterine mucous membrane." Heschl and others are of the opinion, that the muscular substance of the uterus is denuded, and that here and there delicate shreds, which are remnants of the decidua, may be seen attached to it. They state that a few days after delivery the whole inner surface of the uterus is covered with a more or less red, soft, pulpy, villous substance. From my own experience, and after a careful investigation of the subject, I must assert, that in normal labor, that portion of the decidua remains attached which I have mentioned as being a sort of rete Malpighi, and, that upon the external surface of the expelled membranes a thin layer of cells is found, similar to those which constitute the succulent, wide-meshed stratum covering the inner surface of the uterus. I would compare it to cases in which the epidermis is raised in the form of bullæ (blisters or pemphigus), in which similarly a thin layer of the germinating cells of the epidermis remains upon the denuded surface. From a theoretical point of view it is difficult to understand from what elements the uterine mucous membrane with its glands, which are essentially epidermoid structures, could be reconstructed, if in every normal labor the muscular substance was denuded.

About the fourth day after the expulsion of the foetus fatty degeneration of the smooth muscular fibres of the uterus commences, and progresses in such a manner as to cause degeneration of the fibres into fatty granular cells, which finally are completely absorbed (Heschl). At the same time the completely contracted uterus becomes small, the substance of its body and fundus of a pale yellow, yellowish-red color,

and friable, especially its innermost layers, and its mucous membrane is replaced by an extremely succulent, velvet-like, dark-red stratum.

According to Heschl, the commencement of a new-formation of muscular fibres is seen at the fourth week after labor, in the form of nuclei and caudate cells, and thus the involution of the uterus is generally completed at the end of the second month after delivery.

The muscular substance of the cervix degenerates in like manner, but, owing to its lesser importance, its external character is less altered; this involution of the cervix is said to be accompanied at the same time with extravasations within its tissue.

By the complete contraction of the uterus the veins at the seat of the placenta are nearly completely closed, still, hæmorrhage would continue from the open vessels if clots were not formed to insure their perfect closure. Consequently, at the seat of the placenta, physiological thrombosis occurs after delivery (Virchow), and the free ends of these thrombi, projecting into the uterine cavity, produce that tuberos uneven appearance noticed at the above-mentioned place during the first days after delivery. The walls of the vessels finally coalesce, and for the most part are absorbed by fatty degeneration. The occluding thrombi decompose, or are cast off and mix with the so-called *lochial secretions*, whereupon normal mucous membrane grows over the former seat of the placenta.

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Under the name of puerperal diseases all those affections are comprised which, commencing with pregnancy, delivery,

or the puerperal state, assume an acute course during the latter, and the origin of which can be traced to anatomical alterations accompanying the former conditions.

We do not propose in these few lines to follow the investigations, however interesting, upon the general etiology of puerperal diseases, and I intentionally avoid entering into the discussion of questions which have already been discussed with peculiar acrimony, especially that of *cadaverous infection*.

But in general it must be stated, that undoubtedly puerperal affections occur here and there in an epidemic form, and that epidemics of puerperal fever frequently coincide with other epidemics, chief among which we must reckon epidemic erysipelas, an affection nearly related to, if not identical with puerperal diseases. It should also be mentioned that puerperal diseases occur at many localities in an epidemic form (Kiwisch), however singular such a statement may seem.

Before proceeding further, I must unconditionally agree with Kiwisch and Buhl, that in all puerperal diseases the inner surface of the uterus is the first affected, and that all subsequent affections derive their origin from puerperal metritis or endometritis, and are dependent directly or indirectly on them.

The primary affection, therefore, is always local, and its extension is either limited to the organ afterward affected, which is the uterus, or it spreads by contiguity to adjacent parts, as the oviducts, peritoneum, and ovaries; or, finally, it extends to the lymphatics and veins, in which case the disease has progressed far beyond its original seat.

The inner surface of the uterus in the majority of cases, being the primary seat of the puerperal affections, the next question is, what is its normal condition? I have already stated that the uterine mucous membrane, which was transformed into a decidua, is not wholly cast off, but only its innermost layers, leaving behind at least a part of the germinating stratum of the membrane. A portion of the

inner surface of the uterus is occupied by the seat of the placenta. At this point we find open veins, the calibre of which is diminished by normal contraction of the uterus, and which are partly occluded by coagula. Finally, we must mention those frequent fissures always occurring in primiparæ, which commence at the vaginal portion and extend more or less highly and deeply into the substance of the cervix. French pathologists have pointed to these fissures as the exclusive causes of puerperal affections, which is absolutely false, for we observe quite a number of the latter without there being any traces of fissures.

In the three conditions just mentioned, I hope to be able to establish the causes of puerperal diseases.

The first lies in the thin mucous lining of the uterus, an exceedingly vulnerable tissue, consisting of young elements, which readily slough and require only a slight exciting cause to produce that affection which has been termed *endometritis*.

The point of placental attachment being the seat of physiological thrombosis, may become the starting point of extensive thrombosis, and the cases formerly described as puerperal metrophlebitis mostly belong to this class.

The fissures occurring during labor represent wounds in an organ whose absorbing power is increased to an extraordinary degree. Deleterious influences, as malarious miasmata, will therefore readily affect the blood through this source.

The latest classification of puerperal fever, as given by Buhl, is based upon anatomical data, and therefore deserves a careful consideration.

Buhl distinguishes three forms; the *first*, represented by *puerperal peritonitis without pyæmia*, is developed from endometritis, by extension of the latter through the oviducts to the peritoneum.

The *second* form, *puerperal pyæmia without peritonitis*, is developed in the form of traumatic pyæmia; the primary

affection is again *endometritis*, with absorption of ichorous or foetid substances into the veins, and *thrombosis* of the uterine veins, especially at the point of placental attachment; this form might therefore be termed puerperal pyæmia with phlebitis. Evidently, this form is very dangerous from its metastatic tendency.

The *third* form which Buhl mentions is *puerperal pyæmia with peritonitis*, or *pyæmia with lymphangitis*; endometritis in this the most malignant form of puerperal disease, extends to the lymphatics.

Finally, as a *fourth* form, Buhl mentions *puerperal pyæmia without phlebitis and lymphangitis*, which being combined with retroperitoneal œdema, he considers as coming under the third form. All the epidemics of true puerperal fever, according to him, are distinguished by the prevalence of the third form.

How far I agree with Buhl, will appear from the following description of the individual processes and their consequences. I will state at once, however, that I only differ from him in some details, and unhesitatingly accept his classification of three forms of this affection.

a. PUERPERAL INFLAMMATION OF THE UTERINE MUCOUS MEMBRANE. PUERPERAL ENDOMETRITIS.

Puerperal endometritis chiefly affects the mucous membrane of the cavity of the body of the uterus, while that lining the cervix, remaining in its integrity, does not always participate in the affection, or if at all, only in a very slight degree.

Rokitansky distinguishes three degrees of puerperal endometritis, between which no exact limit can be drawn, but which, nevertheless, may easily be distinguished anatomically from each other.

In the first or slightest degree of endometritis, we find the

mucous membrane in a generally well contracted uterus, softened, swollen, and visibly congested. The inner surface of the uterus is covered by a viscid, sometimes muco-purulent fluid; at the points where the submucous tissue is denuded, an albuminous fluid is frequently found in the form of yellowish, or greenish-yellow transparent, or slightly turbid striated collections, extending along the intermuscular fibres of connective tissue. The inner stratum of uterine tissue is generally found in a state of œdematous relaxation; at the seat of the placenta however there is scarcely any apparent change. In the severer forms of this disease the mucous membrane of the body and fundus, which is easily removed, is covered with a furfuraceous pale-brown or brownish-yellow deposit, the innermost layers sloughing away as in diphtheria. This is either limited to small isolated points, or extends over the whole mucous membrane, with the exception of that lining the cervix, and forms the second degree of puerperal endometritis.

In this degree the uterus is not so well contracted as in the slighter, still, its contraction is tolerably normal. Its mucous membrane is more swollen, relaxed and congested, and soon changes into a whitish, yellowish, brownish, and discolored slough, which is easily removable, and sometimes hangs in shreds. At other points croupy membranes are found, varying, but generally slight in extent; the uterine tissue appears more succulent, and between the bundles of muscular fibre, especially of the deeper layers, a considerable amount of albuminous exudation is found.

Sometimes the mucous membrane, partly in a sloughed and partly in an intensely congested condition, is raised in round elevations by an exudation frequently mixed with extravasated blood, and I remember several cases in which the still adherent decidua was so relaxed, partly from uterine contraction, partly from exudation mixed with blood, as to form loose sacs, and causing the inner surface of the

uterus to appear as if covered with varicose veins. Here I should remark, that the non-detachment of portions of the decidua has not hitherto been duly appreciated. I have frequently convinced myself, that when portions of the decidua remain attached to the uterus, they are the first to become gangrenous, owing to deficient nutrition (especially if contraction of the uterus is impeded by other circumstances, or from miasmatic or contagious influences). Although retention of portions of the decidua is of lesser importance than the retention of portions of placenta, I would nevertheless advise more attention to be paid to the former, as I am of the opinion that a considerable number of cases of puerperal endometritis are attributable to the retention and subsequent gangrenous condition of portions of the decidua. These remnants of decidua are most frequently found in the vicinity of the seat of the placenta.

While in the slighter degrees of puerperal endometritis the above-mentioned part is unaltered, in the higher degrees it is generally more prominent, and the coagula occluding the open vessels are generally discolored, of a greenish, whitish-gray color, and sometimes putrefy at their inner extremities. The thin septa between the deepest sinuous venous spaces occluded by the coagula are sometimes found in a gangrenous condition. Here and there collections of pus and sloughing portions of parenchyma are met with (Rokitansky).

In this degree of endometritis the contents of the uterus consist of a muco-purulent fluid mixed with blood, also detached diphtheritic portions of mucous membrane, remnants of decidua, loose and putrefying portions of coagula, or a discolored reddish-brown, or blackish, offensive fluid. Rokitansky has compared this development of puerperal endometritis with a form of dysentery in which similar elevations are found, a tumefaction of the submucous tissue, similar to that occurring in some cases of endometritis.

The highest degree of this affection presents a condition

which is unsurpassed in frightfulness by any other disease, and for which *putrefaction of the uterus* would be a mild name. To the honor of the obstetrical art be it said, that such degrees of destruction are very rare. Plagge's *endometritis nosocomialis*; Cruveilhier's *typhus puerperalis*, *metritis septica*, *sphacelus uteri puerperalis*, and Böer's *putrescentia uteri*, are synonyms for this condition. In such cases the uterus is imperfectly contracted, its walls are thin, its peritoneal surface reddish and discolored, and presenting various shallow depressions from pressure of adjacent coils of intestine (Kiwisch). The uterus consequently projects considerably into the abdominal cavity, and is generally directed obliquely toward one or other side. Upon dissection, the submucous tissue underlying the brownish-black mucous membrane, is found transformed into a whitish or yellowish slough, well defined from the muscular tissue, the latter, however, presenting a dirty-reddish, succulent and softened appearance. The seat of the placenta is generally deeply ulcerated, the thrombi cast out from the extremities of the veins, slough into shreds, and between and within them is a discolored, chocolate-like ichorous fluid, or a purulent substance, and sometimes creamy thick pus. Sometimes the sloughing extends into the uterine substance proper, causing deep excavations on the inner surface of the uterus, and destroying a considerable amount of its muscular tissue. The destructive process in one or several well-defined points, may extend through the entire thickness of the uterine walls to the peritoneum, which, at its centre, is of a pale-brown color, finally resulting in perforation of the uterus. Owing to the sharply-defined limits of such a penetrating slough, the perforation sometimes has the appearance of being closed by an incarcerated gangrenous plug (Rokitansky).

The rest of the uterus is generally of a dirty bluish-red color, is doughy and soft, and its muscular tissue lacks that firmness, which, if this term is applicable to the fulness and

elasticity of a recently-delivered uterus, is noticed even in the dead body. The external surface of the organ presents depressions from pressure of adjacent tympanitic coils of intestines.

As previously mentioned, this affection of the mucous membrane lining the body of the uterus, rarely extends to that of the cervix; in the severest forms of this disease, however, the latter appears tumefied and œdematous, frequently to such an extent that the transverse folds of the *palmae plicatae* project like loose flaps or clubbed appendices. In rare cases, however, croupy membranes are formed on the mucous membrane of the cervix, or the latter is in a state of diphtheritic sloughing.

The œdema of the uterus in such cases frequently extends to the parametritic cellular tissue, and sometimes high up along the mesentery of the small intestine and toward the lumbar vertebræ.

Puerperal endometritis not unfrequently extends to the mucous membrane of the oviducts, causing similar phenomena in these organs. The inflammatory process may even extend beyond and produce puerperal perimetritis, and afterwards general peritonitis. In many cases endometritis is combined with metritis, which latter may be followed by ichoræmia, lymphangitis, thrombosis of the veins and lymphatics, and phlebitis.

It is evident that the local anatomical character of puerperal endometritis, is essentially different from the forms of inflammation usually affecting mucous membranes, and is analogous only to a peculiar form of dysentery. I agree perfectly with Virchow, that in such cases we have a specific inflammation, resembling the phlegmonous erysipelas of the skin and subcutaneous tissue. Virchow therefore defined puerperal endometritis as "*internal malignant puerperal erysipelas*." Its effects upon the blood consist in the absorption of specific substances in a state of decomposition formed by the fluids in consequence of the action of mias-

matic or epidemic influences, and possessing infectious properties.

Puerperal endometritis is frequently fatal without the intervention of any other disease. Among the latter, as arising from puerperal endometritis, we must chiefly mention puerperal peritonitis from contiguous infection. Besides this, it is frequently followed by ichoræmia producing sudden inflammations of serous membranes, as the pleuræ, meninges, and pericardium, with copious serous exudation, extensive œdema and gangrene of adjacent connective tissue, especially the subserous, intermuscular, subcutaneous, and submucous connective tissue; inflammation of the joints, especially of the synovial membranes of the knee, shoulder, and sterno-clavicular articulations (Rokitansky); abscesses of the liver, spleen, parotid, etc.

Puerperal thrombosis of the lymphatics and uterine veins will engage our attention hereafter.

a. PUERPERAL METRITIS.

Inflammation of the substance proper of the uterus, in the majority of cases, is a consequence or extension of endometritis. As we stated in describing the latter, the uterine connective tissue in this affection is found in a state of *cloudy swelling* (trübe Schwellung) owing to the exudation of an albuminous fluid. According to Virchow, this condition probably commences as hyperæmia, and even in its first stage, an experienced eye will detect certain cloudy opaque lines and patches. The swelling is said to be less apparent in the beginning than the cloudiness, but as the disease increases in intensity the former becomes more marked, and you may perceive a slightly gelatinous condition of the intermuscular connective tissue—a kind of firm œdema. Upon microscopical examination the corpuscles of the connective tissue are seen to be enlarged, their contents denser and more abundant, and sometimes distinctly granular. At an early period the nuclei also

become enlarged and divide, which fact indicates the commencement of formative changes. After this, the cells also divide, and sometimes you find adjoining rows of small, round granulation-cells. From this almost literal description of Virchow, I only differ in this one unimportant particular, that in precisely such cases I have distinctly recognized endogenous proliferation of elements. As the disease advances, pus is formed in the connective tissue, and the formerly clear and light-yellow infiltration becomes turbid and creamy from the admixture of purulent elements, until finally the portion of tissue affected is "infiltrated with pus." The connective tissue is destroyed by this formation of pus, the adjacent muscular elements from their previous condition of cloudy swelling have passed into that of fatty degeneration or sloughing, and thus contribute to the enlargement of the space occupied by the newly-formed pus, or uterine abscess. In some rare cases, the individual fibre-cells degenerate into thick, glossy, dense structures of *sclerous* appearance. (Virchow).

Puerperal metritis, it is true, frequently affects the entire substance of the body and fundus of the uterus, but the formation of pus generally takes place only in isolated and limited portions of the uterine walls; hence, we speak of metritis in the form of purulent collections. Virchow states, that diffuse metritis is more likely to occur in the external layers of uterine tissue beneath the peritoneum, as for instance in the anterior, posterior or lateral walls, and thence extends to the loose connective tissue around the vagina and cervix, and from the latter to the broad ligaments and the sheaths of the blood vessels and lymphatics.

The abscesses formed in the above manner, are sometimes, from degeneration of the pus, transformed into ichorous cavities which may extend from sloughing of their walls, and ultimately perforate through either of the uterine surfaces. Rupture of the abscess into the cavity of the uterus is the more simple termination, and perforation into the peritoneal

cavity the more important, as it either leads directly to peritonitis, or, neighboring viscera, which have previously become adherent, may likewise be perforated, thus establishing a communication between the separate cavities. This is chiefly the case with the intestines, and the communication of their cavities with such abscesses is most important, as the ichorous process maintained, and sometimes aggravated, by contact with faecal matter.

Uterine abscesses are distinguished by an enlargement of the lymphatics by puerperal lymphangitis and sloughing of lymphatic thrombosis, by the presence of the investing membrane. They are less distinguished from purulent phlebitic collections, with which they are frequently combined in such a manner that an abscess, following the course of the affected veins is added to phlebitis, and a single cavity is finally formed by sloughing of the venous walls. Metritis may be protracted for an indefinite time, and the isolated abscesses become larger at the expense of the uterine tissue, and finally lead to so-called *phthisis* of the puerperal uterus.

Uterine abscesses are generally combined with endometritis and other puerperal affections of such severity that a cure rarely follows. Nevertheless, we sometimes find that the incarcerated pus undergoes either fatty or calcareous degeneration, and a sequestrating growth of connective tissue takes place in the walls of the uterus, resulting in the formation of a cavity containing a condensed, fatty, lardaceous substance. Undoubtedly, diffuse metritis may terminate favorably at an earlier period, by fatty degeneration and absorption of the purulent cells previously formed. Another termination of diffuse metritis, is analogous to so-called induration of tissue. In such cases, formative irritation may have existed from the commencement, and the destructive tendency of the inflammatory process may have been arrested at an early period. Permanent hyperplasia of the connective tissue is the early result of this process.

The most frequent form of metritis, is that which arises from laceration of the cervix and vaginal portion, and which is always found to a considerable extent in conjunction with endometritis. The laceration gives rise to more or less hæmorrhage, which is arrested by thrombosis, a membranous coagulum, commencing at its upper angle or sub-mucous borders, generally extending over the lacerated surfaces. In the adjacent tissue, an inflammatory œdema takes place, and frequently lymphomes turbidosis is superadded. In other cases the surface of the uterus, until finally sloughs, and the diphtheritic membrane is cast off with pus." The tissue infiltrated with turbid fluid.

Owing to their origin, we must distinguish from lacerations, contusions of the cervix, and inflammation in the lower portion of the cervix, frequently in its lower wall, but which, nevertheless, exhibit the same phenomena.

Puerperal metritis, however, is developed either as an inflammatory process, from the extension of endometritis, or it arises from lesions occurring during labor. The latter form very rarely leads to the formation of abscesses.

Puerperal metritis is frequently combined with lymphatic thrombosis, (metro-lymphangitis), especially when lacerations of the cervix exist, likewise with metro-phlebitis and the sequelæ of those affections. The inflammatory œdema occasioned by lacerations of the cervix may finally terminate in extensive ichorous parametritis.

c. PUERPERAL THROMBOSIS OF THE LYMPHATICS AND PUERPERAL LYMPHANGITIS.

Affections of the uterine lymphatics during the puerperal state are very frequent, and are always secondary, that is to say, they generally arise from metritis or endometritis. Here again credit is due to Virchow for having enlightened us on the subject of inflammation of the lymphatics of the uterus, and I cannot otherwise than corroborate his recent investigations on this subject, and entirely approve of his conclusions.

In some puerperal affections of the uterus which are combined, without exception, with imperfect contraction of the organ, we usually notice a dilatation of the lymphatic vessels, which is rarely uniform but generally sac-like, and is frequently so extensive that distinct elevations are formed on the surface of the uterus. These distended lymphatics contain a pale-yellow, loose, gelatinous, sometimes firm coagulum which adheres to the walls of the vessel, and is evidently of a fibrinous nature. This coagulum frequently softens from its centre into a purulent, pale, yellowish fluid, sometimes containing several large fibrinous flakes, and if such a lymphatic varix is incised, it will seem as though an abscess had been opened. But after removing the coagulum attached to the periphery of the wall, you will easily be convinced that the lymphatic vessel is perfectly intact, notwithstanding its considerable distention.

It is evident that lymphangitis is out of the question in such cases, and that we have simply to deal with lymphatic thrombosis. If you inquire into the origin of this affection, the first question to be asked is,—what caused the coagulum of lymph, it being recognized that normal lymph contains fibrinogenous but no fibrino-plastic material, and, therefore, lymphatic fibrin does not coagulate spontaneously? We must, with Virchow, answer the question as follows: that probably under the influence of the local affection which causes lymphatic thrombosis, the fluids of the tissue have undergone such changes as will cause the production and spontaneous coagulation of fibrin in the tissue itself. In such cases we always find the tissue of the uterus, infiltrated with a kind of gelatinous or fibrinous substance, which originates probably from a chemical transformation of the inter-cellular substance of the connective tissue, combined with increased transudation. Lymphatic thrombosis, therefore, is always combined with *fibrinous endometritis* and *parametritis*, and is consequent upon these affections.

The second question relates to the cause of the dilatation, and the explanation of the process is found in two circumstances : first we must remember that coagulated lymph cannot circulate and must, therefore, be retained in the vessels ; and secondly, as I have already stated, that lymphatic thrombosis is always found under circumstances in which the muscular elements of the uterus, and undoubtedly the walls of the lymphatics, have lost their contractility, causing passive dilatation from the very beginning. The concurrence of these two circumstances is certainly sufficient to cause considerable dilatation.

Lymphatic thrombosis affects either the lymphatics of the uterus only, or it extends to those of the broad ligaments and along the spermatic veins or vertebral column up to the diaphragm. Frequently, thrombosis affects only the lymphatics of one side, generally that on which the corpus luteum has been formed, or to which the placenta has been attached (Buhl). Frequently it is combined with adenitis, and in severe cases even the thoracic duct becomes filled with purulent dissolving coagula.

With the occurrence of complete thrombosis of the lymphatics, the passage of altered fluids into the blood is prevented, and on this account the prognosis of this disease is not unfavorable ; it is a barrier to infection (Virchow) so long as the thrombi, which are naturally soft, do not dissolve and cause direct infection of the blood. But the cause of lymphatic thrombosis, diffuse phlegmonous inflammation, possesses in itself such a marked tendency to destructiveness, that the unfavorable termination of such forms can be explained independently of a direct infection of the blood through the lymphatics.

It must also undoubtedly be admitted, that all the lymphatics are not always affected with thrombosis, some of them allowing absorption of putrid substances of local origin, while others are incapacitated from so doing by thrombi, and also that the latter may be formed after a sufficient amount of ichorous fluid has been admitted into the blood through these vessels.

As we frequently find thrombosis extending high up, even beyond the first intervening lymphatic glands, we therefore have sufficient proof, that the lymph was rendered coagulable by a local process, and that it coagulated spontaneously only after a certain time.

In the same manner we will be obliged to explain those cases in which we find adenitis without thrombosis of the lymphatics. These are frequently the worst cases, and I am compelled to conjecture, that the fluids absorbed in such were absolutely uncoagulable, and that the fibrinogenous substance was previously decomposed and so chemically transformed as to render coagulation impossible. At the same time a *leucocythæmic* condition of the blood is developed, and general infection is evident from the well-known secondary affections which we recognize in various organs, presenting the character of phlegmonous inflammation, and even diphtheritic degeneration.

The connections between the lymphatic dilatations and the lymphatic ducts is not always easily recognized, as the vessels frequently appear deflected from the well-defined distended sac.

After lymphatic thrombosis has existed for a certain time, a secondary derangement of nutrition, generally of an inflammatory character, is developed in the walls of the lymphatic vessels (lymphangitis).

The anatomical characteristics of lymphangitis are well known; while at the commencement the inner coat of the vessels was smooth and glossy, it now becomes dim, grayish, opaque, and is easily removed, and the outer coat becomes thickened from imbibition and proliferation of cells, small purulent collections being formed beneath the inner coat of the vessel, which are visible as pale yellow spots. The muscular elements of the wall of the vessel generally become atrophied from fatty degeneration, and at the same time you perceive that the thrombi have deliquesced into a purulent mass. In the higher degrees of this disease, the wall of the lymphatic vessel frequently appears bluish-red from imbibition, and its purulent contents

show a bloody tinge, attributable not to a direct admixture of blood, but also to imbibition. Finally, the contents of the vessels degenerate into a discolored, dark-brown, nauseous ichor, its wall is likewise discolored or even destroyed, and the lymphatic sac is thus made to communicate with ichorous cavities formed from degeneration of abscesses originating in the uterine tissue, or, in the walls of the lymphatic vessel. This condition is chiefly found in those cases denominated by Böer as *putrescence of the uterus*.

Puerperal lymphangitis, strictly speaking, is therefore a tertiary disease, that is, from diffuse metritis, especially when it assumes a phlegmonous character (internal malignant erysipelas), thrombosis of the lymphatics is first developed, and in consequence of this, inflammation of the lymphatic walls. This does not mean to imply that lymphangitis cannot possibly occur independently of thrombosis; in such cases, inflammation of the glands along the vertebral column, and of the iliac and inguinal regions, generally exists. At the same time we must presume, that an infection of the blood has preëxisted, the consequences of which are frequently apparent in other organs after death.

The most important and frequent consequences of lymphangitis are the following :

The peritoneum is first affected, peritonitis setting in with copious exudation and abundant production of fibrin and pus. The spleen is always enlarged, softened, and dark-red; the Malpighian bodies are often greatly enlarged, and milk-white; the liver is sometimes enlarged and blood-red, but in the majority of cases it is flaccid, anæmic, and appears fatty, and microscopical examination distinctly shows an acute degeneration of its elements, similar to that found in Rokitansky's *acute yellow atrophy of the liver*. Buhl describes this condition more minutely, and takes it for granted that Rokitansky's yellow atrophy of the liver is only the highest degree of a process frequently met with in a slighter degree. By de-

monstration of the primary seat of the infectious disease being in the uterus, the concomitant affections of the liver appear only as a partial phenomenon of an analagous process occurring also in other organs. Thus, we almost constantly find fatty metamorphosis of the muscular fibres of the heart, which is apparent to the naked eye from the condition and pale-yellow color of the organ.

Buhl also found acute softening of various muscles of the body; once those of the right arm; another time, the glutei muscles of the left side, with staff-like scattering, and molecular degeneration of the bundles of muscular fibre into a reddish-yellow or reddish-brown pulp, imbibition with granular parenchymatous fluid, varicosity of the capillaries, and infiltration of their walls with molecules. The kidneys are frequently found in a flaccid condition, and their epithelium partly in a state of *cloudy swelling*, other parts of them containing fattymolecules and undergoing destruction.

Buhl describes a case in which the pancreas was enlarged at least one-half, from parenchymatous inflammation; and in some cases in which adenitis extended up the vertebral column, I have seen the pancreas considerably tumefied from interstitial œdema.

Among the consequences of this infection of the blood, we never meet with metastatic abscesses of the lungs, but not unfrequently with diphtheritic sloughing of the bronchial mucous membrane and a similar lobular affection of the lungs. I have also the notes of a case in which the lymphatic glands, situated at the pulmonary hilus of the left side, were gangrenous, and ichorous infiltration extended quite a distance along the bronchus, with diphtheritic deposits in the surrounding lung tissue. Buhl mentions the increased destructibility of the pulmonary epithelial cells, the contents of which appear dusky and dim owing to the presence of a fine granular substance; once he observed lobular diphtheritic inflammation of both lungs. Pleurisy, which is also frequently observed, is engendered, according to Buhl and E. Wagner, by local lymphangitis.

From the manner in which these secondary affections appear, it is evident that they have distinct characteristics, and must be attributed to a derangement of nutrition, which can be accounted for in no other way except that of blood-infection from absorption of putrescent fluids (ichoræmia). All these secondary affections, in my opinion, may be classified in two groups; they are either merely active inflammatory processes, arising from a continuation and extension of inflammations originating in the uterus, and nearly allied to erysipelas, or, they are complicated in the above manner with lymphatic thrombosis simultaneously with infection of the blood. These alterations are characterized by an abundant exudation of fibrin and formation of pus; or they are due to asthenic derangements of nutrition, as in fatty degeneration of the liver and heart, and I would call attention to the frequency of fatty degeneration of these organs manifesting itself, although in a slight degree, even during pregnancy. However, I do not mean to contradict the statement of Buhl, that in the liver and kidney a specific parenchymatous inflammation is frequently met with.

d. PUERPERAL VENOUS THROMBOSIS, AND PUERPERAL METROPHLEBITIS.

Puerperal thromboses are formed in the venous system, especially the utero-vaginal plexus, the origin of the hypogastric and internal spermatic vein (pampiniform plexus), either as primary or secondary thrombosis.

Primary thromboses are either continuances of those at the seat of the placenta, or they are developed from compression, dilatation, or marasmus.

I have already stated the fact established by Virchow, that contraction of the uterus, although essential, is not sufficient to arrest the hæmorrhage from the placental veins, and that closure of the compressed venous extremities is finally accom-

plished by a physiological thrombosis. The size of these thrombi must be in proportion to the contraction of the uterus, and, consequently, according to the intensity of the endometritis, we find at the seat of the placenta small or large thrombi which give the characteristic uneven and nodulated appearance to this part. Thrombi thus developed sometimes extend in a central direction, and as a matter of course, the point of placental attachment will determine this direction. At first thrombosis generally affects the uterine veins, and from them extends to those of the broad ligaments, thence to the internal spermatic veins, or in rare instances, to the hypogastric and iliac veins, from which it may extend in a peripheric direction to the crural veins.

Thrombi in the uterine veins are formed by continuous apposition, and generally wholly occlude the cavity of the vessels. At the commencement, they are pale yellow or reddish in color, tolerably firm, and adhere to the walls of the veins, which as yet show no apparent alterations. At a later period the centres of these thrombi, either at isolated points or in larger portions (generally within the seat of the placenta), begin to soften, finally they are transformed into a yellowish or reddish-yellow purulent pulp and assume the appearance of hollow tubes. By this time a change is also apparent in the walls of the veins; their inner coat becomes dull, felt-like, and friable, their muscular coat is destroyed or softened, and dimmed with fine granular elements, small purulent collections are sometimes formed in their external coats. After the dissolution of an entire thrombus, the walls of the vein are likewise destroyed, and an abscess is developed in the uterine tissue.

Dissolution of occluding thrombi, as already described, consists chiefly in a breaking up of the coagulated fibrin mixed with the colorless elements of the blood, generally in a state of degeneration, and perhaps a small amount of free fat and cholesterine crystals. Sometimes, however, the coagula are transformed into an offensive dirty, pale or reddish-brown

ichorous fluid, followed by destruction of the walls of the veins, and consequently causing the formation of large ichorous cavities, the walls of which are composed of gangrenous tissue.

In proportion as the dissolution of a thrombus advances, it increases in a centripetal direction, its cavity always remaining closed at the end farthest from the open extremity of the vein. It rarely happens that the central dissolution of the thrombus extends so far as to cause that extremity of it which opposes the current of blood to be only a line in thickness.

Puerperal thrombi may also be developed *in consequence of compression* of the veins, especially of the common and external iliac and hypogastric veins. They are also sometimes formed during pregnancy, but generally during labor, especially in unfavorable presentations, owing to the pressure of the child's head upon the veins, and arrested venous circulation. (Velpéau).

Thrombosis from dilation occurs in the pampiniform, as well as the utero-vaginal plexuses. These veins are considerably distended during pregnancy, and after labor an active contraction of the veins must take place to prevent the current of blood from being so slackened as to cause the formation of thrombi. If this contraction does not occur, coagula are formed in them, which ultimately extend in the same manner as placental thrombosis.

We may class with thrombosis developed *in consequence of dilatation* at the seat of the placenta, those thrombi formed by retention of a portion of the placenta. If a portion of placenta adheres more firmly to the uterus, the corresponding uterine tissue cannot contract so perfectly as the rest. The tissue of the placenta, ramifying into the venous trunks, maintain a certain expansion of the uterine tissue, giving rise to the well known obstinate hæmorrhages and thromboses, the cause of which I attribute to this dilatation of the veins.

Finally, thrombi are sometimes formed during the puerperal

state, and for the present, unless a local cause be found for this occurrence, we must assume that a so-called *marastic thrombosis* has been developed from a lessening of the heart's action. Its production during the puerperal state may easily be accounted for if endometritis or metrolymphangitis is present, as molecular alterations of the muscles of the heart, previously alluded to, sufficiently account for the diminished contractile power of the organ.

The consequences of thrombosis, from whatever cause they may be developed, are generally the same. In the first place, from continued extension of coagulation, they may reach the main venous trunks, and their conical extremities may project into the latter. A large venous trunk may thus be occluded by new coagula, whereupon the consequences of interrupted venous circulation are developed in the corresponding parts. Thus, the so-called *phlegmasia alba dolens* may be produced by thrombi developed at the seat of the placenta extending into the iliac vein. More frequently, however, this disease seems to be occasioned by thrombosis arising from compression or dilatation.

A further local consequence of thrombosis is inflammation of the walls of the veins; *phlebitis* is then superadded to thrombosis. The alterations then occurring in the walls of the veins have already been described.

Puerperal uterine phlebitis generally leads to the formation of abscesses originating chiefly in the outer coat of the uterus, and the formation of ichorous cavities which are most extensive in the highest degrees of endometritis (putrescence of the uterus).

The most important consequence of thrombosis is the danger of emboli, large or small portions of softened thrombi being carried off by the circulation, and arrested chiefly in the pulmonary vessels. Large emboli may occasion sudden death by obstructing the pulmonary artery. Smaller particles become lodged in peripheric ramifications of the pulmonary

artery, causing either sudden occlusion of the vessels, ischæmia in the surrounding tissue, and increased collateral circulation with hæmorrhages, or, they diminish the calibre of the vessels in which they have lodged, and secondary thrombosis being developed, leads to complete occlusion of the vessels. In both instances, especially when degeneration of the thrombus has already commenced, or ichorous cavities have been formed in the uterine tissue, so-called metastatic abscesses and gangrenous affections of the lungs are developed, which latter have a tendency to ultimately involve the pleura, and, in consequence of the perforation of the latter, ichorous pleurisy or pneumo-pyothorax is developed.

If in conjunction with metastatic abscesses in the lungs, similar destruction of portions of the spleen, kidneys and brain are found, they must generally be attributed to mechanical metastasis originating in the lungs. Sometimes, however, metastatic abscesses are found in the last named organs, the origin of which cannot be traced to the lungs. In such cases I have been unable to convince myself that small detached particles passing through the entire capillary circulation of the lungs without being arrested, could so increase by apposition during their transit through the blood, as to occlude the smaller arteries of the spleen, kidneys and brain. In such cases I would rather search for the source of the embolus in the left ventricle of the heart, and I have been able to demonstrate so-called *globulous vegetations* in the apex of the left ventricle, the origin of which could easily be referred to an affection of the muscular tissue of the heart.

Although hitherto we have spoken of puerperal uterine phlebitis, only as a secondary affection, still, there is not doubt but that sometimes it is primarily developed during the puerperal state, thrombosis ensuing as a secondary phenomenon. Metro-phlebitis generally occurs in the highest degrees of puerperal endometritis, and usually originates at the seat of the placenta. Consequently it most frequently affects the upper

portions of the uterus, but sometimes extends downward along its lateral walls.

Notwithstanding the frequent occurrence of all the conditions favorable to an extension of thrombosis, puerperal thrombosis is quite a rare affection, a fact already noticed by Cruveilhier. More rarely still do we observe puerperal metrophlebitis, especially as a primary affection.

e. PUERPERAL PERITONITIS.

Puerperal peritonitis is either general or partial. In the latter form it chiefly affects the peritoneum of the uterus, broad ligaments and pelvic viscera in general (pelvic peritonitis).

Partial peritonitis is generally a consequence of puerperal metro-salpingitis, which is itself due to endometritis.

General peritonitis is either developed from partial peritonitis, or it occurs as a direct complication with the puerperal state, and, like inflammations of other serous membranes, must be referred to ichoræmia. It is, therefore, combined with endometritis, thrombosis of the lymphatics, and puerperal lymphangitis.

I must contradict the assertion of some authors that a slight perimetritis occurs after every normal delivery during the *puerperium*, and that in every woman who dies during the puerperal state, although from no puerperal disease, products of inflammation are found on the peritoneum covering the uterus, in the form of thin, pale-yellow, false membranes. But it cannot be doubted that peritonitis may be developed during the puerperal state, especially in the form of perimetritis or pelvic peritonitis, independently of salpingitis, oophoritis, or ichoræmia. A predisposition arising from previous similar affections or excessive traction of the peritoneum during labor must account for such cases, as derangements and alterations of circulation sufficiently explain the return of an affec-

tion which otherwise has no connection with the puerperal state.

Pelvic peritonitis is characterized by proliferation of connective tissue which, in the form of pseudo-membranous bands and membranes, binds the pelvic viscera together, and may consequently give rise to serious consequences, which will be discussed with AFFECTIONS OF THE LIGAMENTS OF THE UTERUS.

General peritonitis is frequently accompanied with abundant exudation, development of pus and proliferation of tissue. The abdomen is generally distended to an enormous extent, the intestines are filled with gas, adjoining portions of them become agglutinated by yellow coagula which sometimes present a distinct icteric tinge, and the points of agglutination are surrounded by a circle of congestion. Here and there a whey-like, purulent fluid is enclosed between the agglutinations. The intestines occupy the anterior and superior portions of the abdomen, the lateral portions and the pelvic cavity containing a turbid, whey-like exudation, mixed with fibrinous coagula. Frequently thick pus from its weight accumulates at the bottom of the pelvic cavity.

In the highest degree of endometritis, which is frequently combined with ichorous puerperal salpingitis, also when metritis or puerperal oophoritis have terminated in abscesses or perforation, the exudation degenerates into a pale, brownish-red, nauseous, discolored fluid ichor, usually with accompanying intense inflammation of the peritoneum of the uterus and appendages.

Puerperal peritonitis alone, will often cause sudden death, but its fatality is still greater when complicated with other diseases. In other cases it continues for a long time as chronic peritonitis; the purulent collections mentioned become encysted by proliferation of peritoneal connective tissue, and a considerable amount of pus collects between adherent intestines and in encysted portions of the peritoneum. Pus thus

encysted may become harmless from fatty degeneration and may undoubtedly be absorbed, or transformed into a whitish, fatty pulp, mixed with calcareous salts. In other cases, however, the production of pus from the connective tissue and the destruction of purulent elements continues, and the patient ultimately dies from exhaustion.

These purulent collections will not unfrequently cause destruction of the tissue around them, the false membrane undergoing fatty degeneration or sloughing inwardly. This destructive process extending to the peritoneum and walls of the intestines, finally causes perforation of them, and thus allows the escape of gas and fecal matter into these encysted cavities, whereupon the pus contained in them decomposed into ichor, and either acute extension of the peritonitis or ichoræmia terminates the life of the patient. The involution of the uterus in this case is always arrested, and its tissue remains flaccid and friable for a long time.

The ichorous process in the peritoneum (peritoneal phthisis) according to what has been said, may extend not only to the intestines, but also to all the pelvic viscera, and the abdominal walls. Communications may be formed between several cavities, or perforations of various canals and reservoirs (gall and urinary bladders), of the diaphragm and anterior abdominal wall may take place; parametritis may extend from Douglas' sac, and the ichorous cavities may penetrate to the pelvic bones, involving their periosteum, and causing superficial necrosis of them, or they may perforate through the perinæum, and even into the vagina. Erosions of the adjoining abdominal viscera (liver and spleen), with considerable hæmorrhage, have also been observed as consequences of such peritoneal ichorous cavities.

In acute peritonitis, extreme distention of the intestines, and consequently of the entire abdominal cavity, is caused by paralysis of their muscular coat; the diaphragm in such cases is sometimes pressed upward as far as the level of the superior

margin of the third rib, at the same time the heart is pushed considerably to the left, and sometimes there is compression of the inferior lobes of both lungs.

With the exception of puerperal oophoritis and metrosalpin-gitis, we have described those conditions which form the anatomical bases of so-called *puerperal fever*. The dependence of these several processes upon each other is easily understood, and it now only remains for me to describe the manner in which the several affections are combined, and the group of consequences which correspond to the several groups of complications.

Endometritis is generally the primary affection, and is frequently combined at its very commencement with diffuse, or at least partial metritis, where deep lacerations of the uterine tissue have occurred.

Most frequently, endometritis and diffuse metritis, which latter easily escapes attention, are combined with lymphatic thrombosis, lymphangitis, or adenitis. The disease generally assumes the character of erysipelalous inflammation of the skin and connective tissue, and as the cause of this specific affection (malignant puerperal erysipelas, Virchow,) miasmatic and contagious influences are adduced. We, therefore, mostly meet with these forms in post-mortem examinations made during puerperal epidemics. The infection of the blood, therefore, originates in the uterus, chiefly in an indirect manner, from infection of the lymphatic fluids. Lymphatic thrombosis stands in a different relation to lymphangitis than venous thrombosis does to phlebitis. Where primary phlebitis occurs, venous thrombosis is always the direct consequence of it, and from this, the mechanical metastases, which are almost regularly developed in consequence of these thrombi. But, if lymphangitis occurs primarily, coagulation of lymph is not a necessary consequence, the effect of deranged

nutrition on the vascular wall being insufficient to cause spontaneous coagulation of the fibrinous substance in the lymphatic fluid. In puerperal lymphangitis, therefore, mechanical metastasis very rarely occurs, but general infection is produced by the entrance of ichorous fluids into the blood, from the lymphatics. The consequences of this ichoræmia have already been mentioned. They appear in the form of erysipelatous or diphtheritic inflammations of other organs. We are unable to prove that these processes are the results of mechanical metastasis, and are constrained to believe, that in the affection of the blood alluded to, the connective tissue is first in danger of being secondarily affected.

In regard to only a few of these affections, as for instance peritonitis, abscesses in the liver and spleen, and possibly pleurisy, a direct extension from the lymphatics communicating with the uterus might be surmised. Whether lymphatic thrombosis may originate and extend in a peripheric manner, as for instance, like venous thrombosis, may be admitted from analogy, but direct proofs are wanting. It is apparent that if lymphatic thrombosis extends along the lumbar plexus, or, if the lymphatic glands of that region participate in the inflammation from continuity, the lymphatic current coming from the lower extremities will likewise stagnate, and finally give rise to phlegmasia alba dolens, which may arise from such a condition (C. Braun). This reminds me of those cases in which, notwithstanding extensive inflammatory cedema of the lower extremities, no coagulation is found in the veins. Notwithstanding the dissenting opinions of many pathologists, I cannot lay aside the hypothesis that phlegmasia alba dolens may also originate in this manner, especially as in these cases the inguinal glands are generally found in a state of inflammatory swelling. Simple thrombosis of the veins does not sufficiently explain *spargano-sis puerperarum*, for the former is not always combined with the latter. Probably infection of the blood must be superadded, and this must be taken into consideration in lymphan-

gitis, as well as in lymphatic thrombosis, when considered as a cause of sparganosis puerperarum.

Virchow distinguishes two forms of puerperal peritonitis,—a malignant form of diphtheritic character, and a milder one with superficial exudation and formation of pus. The former belongs to well marked endometritis with lymphangitis, whilst the latter exists in the milder degrees of endometritis, and frequently arises from extension of *salpingitis*.

It is very rare that endometritis is combined with metro-salpingitis and thrombosis. Cruveilhier, who made no distinction between thrombosis and phlebitis, remarks the rarity of metro-phlebitis in comparison with puerperal lymphangitis, and he sought to explain the infrequency of metastatic abscesses in the latter disease by assuming that the pus contained in the lymphatic veins was prevented from entering the circulation by the intervening lymphatic glands. We have remarked, on the strength of recent investigations, that infection of the blood may take place through the lymphatics, not by the formation of embolic metastasis, but by the transportation of ichorous fluid, which passing without difficulty through the lymphatic glands may produce ichoræmia and its consequences. In such cases adenitis always exists, because the material elements of the ichorous fluid arrested in the lymphatic glands must necessarily occasion considerable irritation of the latter; probably also lymphangitis, however slight, is always present. Cruveilhier also noticed the frequency of the combination of puerperal lymphangitis with peritonitis, whilst phlebitis he states, is rarely combined with it.

The dissertations published at Vienna and Prague during the fifth and part of the sixth decennium of this century, upon the origin of puerperal fever, are all written under the immediate influence of the *Crisis theory*, carried by Engel to its climax, and consequently the cause of puerperal fever was sought for in a peculiar condition of the blood of pregnant women, and

it was asserted that *hypinosis* afforded an immunity from the croupy forms of puerperal fever, and that the *hyperinotic* form was apt to change into the *pyæmic*, and in severe epidemics, into the *septic* forms. To Virchow the credit chiefly belongs of having overthrown these mystic views, and Buhl's excellent work on the details of these affections, as well as Virchow's on lymphatic thrombosis and its relation to lymphangitis and diffuse metritis, have probably mainly contributed to elucidating the points in question.

The remaining puerperal affections of the uterus have no direct connection with the combination of symptoms commonly called puerperal fever, and I shall now proceed to the consideration of them, although contrary to the order hitherto observed. It was my intention to place at the head of this section the most important affections which are generally found combined in clinical cases; and this may be my excuse for subsequently considering other not less interesting puerperal affections.

J. PUERPERAL PARALYSIS OF THE WHOLE UTERUS, AND ESPECIALLY OF THE SEAT OF THE PLACENTA.

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Rokitansky was the first to call attention to a condition which is noticed after difficult and protracted deliveries, and which consists of complete atony and non-contraction of the muscles of the uterus. In such cases the uterus is extremely large, thin-walled, rather more collapsed than contracted, flaccid, and evidently in a paralyzed condition.

These phenomena are either apparent in the whole organ or limited to portions of it. The paralysis is either complete or partial.

Partial paralysis more frequently affects the inferior than the superior portion of the uterus, and, according as it is either lateral or annular, the organ assumes various forms. The greatest portion of tissue seems to be accumulated in the non-paralyzed parts of the uterus, whilst the paralyzed portions are thin and flaccid.

The occurrence of such a paralysis may be due to two causes. In the first place fatty metamorphosis may occur during pregnancy at certain points, which, however minute, can be demonstrated with the microscope, and must be considered sufficient cause of imperfect contractions at such points. Kiwisch and Scanzoni have both remarked, that undoubtedly in many cases, partial metritis is developed during pregnancy and may lead to spontaneous rupture of the gravid uterus. Other causes may likewise produce derangement in the nutrition of corresponding tissue, and gradually cause fatty degeneration of muscular fibre and paralysis of that portion of the uterus. Constant pressure from without (as from a projecting promontory), or from within (as from pressure of foetal parts), may give rise to derangements of nutrition in portions of the uterus, and therefore gradually produce paralysis of the affected portion.

On the other hand, the causes of imperfect uterine contractions seems sometimes to be dependent on constitutional causes. It has long since been known that sometimes after successive efforts during labor, or exhausting pains, death suddenly takes place. The anatomical examination of such cases frequently reveals an imperfect contraction of the uterus, but beyond this nothing but hypnosis; consequently acute defibrination of the blood has occurred, as happens in acute tuberculosis. In such cases a slight hæmorrhage has usually taken place during labor, which, in itself however, is absolutely insufficient to explain the fatal termination.

As perfect contraction of the uterus is an indispensable requisite to the stoppage of hæmorrhage, partial or complete paralysis of the organ is consequently a frequent cause of puerperal hæmorrhage.

Imperfect contraction of that portion of the uterus to which the placenta was attached is of the greatest importance, for when such is the case, this portion descends into the distended uterine cavity in the shape of a conical or ovoid mass with a neck-like contraction, whilst the rest of the uterus is tolerably well contracted. On the corresponding external surface of the uterus there is an infundibulum-like depression, or a more or less considerable inversion of the uterine walls. The inverted part, filling the cavity of the uterus like a tumour, is spongy, bleeds readily, and exhibits the characteristics of the seat of the placenta; in the majority of cases either a retained portion of placenta or large coagula are attached to it.

Rokitansky remarks, that such inversion of the paralyzed seat of the placenta is often owing to mechanical removal of the latter, and I attach much importance to this fact, as I am unable to understand why the paralyzed portion of tissue should always sink into the uterine cavity, as the latter is diminished by energetic contraction of the rest of the uterus. It seems absurd to suppose that pressure of the intestines could cause inversion of the paralyzed portion of the uterus. Absolute or relative shortness of the umbilical cord, in some cases, may also be considered as a cause of inversion of the paralyzed portion. The consequences of the above condition are hæmorrhages which may terminate fatally.

The frequency of this occurrence after miscarriages is remarkable, and the first case described by Engel was that of a woman thirty-four years old, who had passed safely through seventeen deliveries and yet miscarried at the fourth month of the eighteenth pregnancy. In this case Engel considered the number and rapid succession of the pregnancies as causes of the paralysis at the seat of the placenta, and he states that the

tumour formed by the inverted paralyzed portion might easily have been mistaken in the dead body—and much more so in life—for an adventitious growth, or a polypus ulcerated at its extremity.

Here it is proper to consider the possibility, admitted by many, of the entrance of air into the open uterine veins. The statement of Cormack (London Med. Journal, October 1850,) that the uterus, when relapsing into a relaxed condition after contraction, absorbs a considerable amount of air, unless the open extremities of the veins be closed by coagula; and that the air thus absorbed is afterwards forced through the veins by renewed contractions of the organ, is founded on the erroneous supposition that relaxation of the uterus may cause the walls of the veins, which were formerly in apposition, to be again separated. If the first contraction, which closes the veins, could be overcome by other antagonistic contractions the effect of which would open the veins; if muscular fibres existed analogous to the radial and circular fibres of the iris—then entrance of air would be inevitable, but upon the cessation of that uterine contraction which causes the walls of the veins to come together, they possessing too little elasticity, cannot, like a rubber tube, reassume the shape of open vessels. I have not yet seen a case which convinced me that air had passed into the open veins of a recently delivered uterus, and I cannot conceive the mechanical possibility of such an occurrence. Lionet, Lever and Simpson assert, that they have observed such cases, and further remark, that the occurrence was immediately followed by a scarlatinous discoloration of the skin, which may be explained as the effect of sudden oxydation of the blood contained in the capillaries of the the skin. Without wishing to lessen the authority of Simpson, it is impossible not to advance the question, whether this was not a case of Helm's *puerperal scarlatina* with rapid putrescence and development of putrescent gases in the blood?

g. HÆMORRHAGES OF LYING-IN WOMEN. FIBRINOUS POLYPUS (KIWISCH). INTRA-UTERINE PLACENTAL POLYPUS (C. BRAUN).

Literature: Kiwisch v. Rotterau, *Klin. Vorträge etc.* Prag 1845. I. pg. 420. — F. M. Kilian, *Henle u. Pfeuffer's Zeitschr. für ration. Medicin* 1848. V. 2. pg. 149. — Chiari, Braun u. Späth, *Zur Lehre und Behandlung der Hämorrhagien. Klinik der Geburtsh. u. Gynäcologie.* Erlangen 1852. pg. 167. — Scanzoni, *Die Genese der fibrinösen oder Blutpolypen des Uterus. Verhandl. der physic. med. Gesellsch. zu Würzburg* Erlangen 1852. II. pg. 30. — Kiwisch, *Notiz. über fibrinöse Polypen des Uterus.* same journal pg. 218. — Virchow, same journal — Mikschik, *Bemerkungen über Metrorrhagien im Wochenbette, veranlasst durch zurückgebliebene Placentarestes.* *Zeitschr. d. Ges. d. Aerzte.* Wien 1854. Juni. 6. pg. 469. — Scanzoni, *Lehrb. d. Krankh. der weibl. Sexualorg.* Wien 1857. pag. 228. — Rokitsansky, *Ein Beitrag zur Lehre vom Abortus und vom fibrinösen Uterus-Polypen* *Zeitschr. der Gesellschaft d. Aerzte.* Wien 1860. Nr. 33. — C. Braun, *Ueber die Nosogenie der intrauterinen Placentarpolypen.* *Allg. Wiener med. Zeitung* 1860. 42. — Steiger, *Fall von heftiger Metrorrhagie, veranlasst durch ein altes Blutcoagulum in der Gebärmutterhöhle.* *Verh. der phys. med. Gessellsch. zu Würzburg.* Erlangen 1860. X. 2. u. 3. Hft. pg. 243. — Rokitsansky, *Path. Anat.* Wien 1865. III pag. 502 u. 538.

From preceding discussions the sources of puerperal hæmorrhage are already understood. Although it cannot be denied but that by the casting off of the uterine mucous membrane transformed into a decidua blood vessels may be laid open, which, unless closed by uterine contraction, may bleed, still, the principal source of puerperal hæmorrhage must be from the seat of the placenta, at which point large venous vessels are left open after the placenta is detached. In addition to this, various lacerations and contusions of the uterus, and secondary erosions of blood-vessels from destructive puerperal processes, may also give rise to fatal hæmorrhages.

Those cases are of the greatest importance in which, from continuous hæmorrhage, coagula are formed in the uterine cavity at the point of hæmorrhage and adhere directly and indirectly to the walls of the uterus. With these we classify

the *fibrinous polypi* of Kiwisch, and Braun's *intra-uterine placental polypus*.

Kiwisch describes extravasations which are retained within the uterine cavity and undergo the usual metamorphosis; that is, a fibrinous membrane is formed at the periphery of the clot, while in its centre soft, slightly coagulated, or fluid blood is found. At the same time the cavities of the body and cervix of the uterus are dilated. Most frequently the coagulum assumes the form of a pedunculated polypus, the pedicle of which is composed of dirty-white fibrin whilst its body consists of soft coagulum with a thin fibrinous covering. This polypoid form is owing to the easier distention of the inferior portion of the uterus.

Kiwisch states that he has only found this kind of polypus in young women who have never borne children but have indulged in sexual intercourse, and that suppression of menstruation for a period of from six to twelve weeks had preceded every case. Contraction of the body and fundus of the uterus and the absence of an ovum, were sufficient reasons to this distinguished Gynecologist to exclude any connection between such formations and miscarriages. The latter circumstance was also deemed a sufficient distinction between fibrinous polypi and blood-moles.

Kiwisch imagines, as Scanzoni proves, that the source of this hæmorrhage is ordinary menstruation, and that the retention of menstrual blood is owing to undue excitement during coition. "The patients always considered themselves pregnant."

Scanzoni refutes the possibility of the accumulation of menstrual blood in a healthy uterus, and remarks that a coagulum formed by gradual extravasation cannot possibly assume the form of the polypus mentioned by Kiwisch (having an external fibrinous covering, and a soft red centre).

Scanzoni also called attention to the peculiar distention of the uterine cavity, which, in the majority of cases, is directly

contrary to that occurring during pregnancy. "If the external orifice is closed, as is frequently noticed after miscarriages during the first four months of pregnancy, the blood extravasated during a subsequent hæmorrhage may accumulate in the uterine cavity and gravitate toward the lower portion of the organ, which is deficient in contractile power, and thus pass into the cavity of the cervix, which has remained dilated after the recent miscarriage. Gradually the body and fundus of the uterus contract, which occurs more readily as the soft coagulum offers but slight resistance to the contraction, and thus the upper portion of the coagulum is compressed and narrowed, whilst the lower portion, lying within the less contractile cervix, becomes round and club-shaped. In the firm periphery of the mass, fibrin, partly unorganized, partly transformed into connective tissue, is always demonstrable. The upper constricted portion of the mass, consisting chiefly of connective tissue, always adheres firmly to the walls of the uterus." (Scanzoni.)

The frequent connection of fibrinous polypi with miscarriages is next pointed out, and the latter is considered one of its principal causes. Scanzoni asserts that previous dilatation of the uterine cavity is an indispensable condition for the formation of these fibrinous polypi. The case which Kiwisch, in opposition to the views of Scanzoni, cites in a later paper, was insufficient to invalidate the weighty objections of the latter author.

Scanzoni's views were most decidedly confirmed by Rokitsansky in the description of two remarkable cases, a brief account of which will be given in the chapter on EXTRA-UTERINE PREGNANCY.

Rokitansky's cases were as follows: "An ovum, after its attachment to the mucous membrane of the uterus, and after it had been completely enveloped by the decidua reflexa, passed from the uterine cavity into that of the cervix, there it remained and continued to grow and distend the cervix, being

at the same time attached to the uterus by a pedicle (resembling a bundle of extremely elongated utricular glands) composed of the excessively proliferating mucous membrane. It is highly probable that the ovum was crowded toward the cervix by premature contractions of the body of the uterus, and not being detached, the decidua was stimulated to unusual proliferation. In such cases, after the membranes were ruptured, or perforated by ulceration, and the embryo expelled, a considerable portion of the membranes or the stump of the pedicle might remain attached, and hæmorrhage occurring, they might become the nucleus of a fibrinous polypus. The extravasated blood would readily accumulate and coagulate in the dilated cervix, as it would be subject to only slight pressure, the superior portion of the uterus being already contracted. The intimate connection of the coagulated blood and the membranes or pedicle of the ovum would constitute an exquisite specimen of fibrinous polypus, formed by a previous passive dilatation of the cervix from displacement of the ovum." Meissner and others have described polypi, composed of a tissue similar to that of the placenta, occurring in recently delivered uteri, and they mention that in several cases it appeared as if fungoid growths had been developed from remnants of placenta or decidua which remained attached, which opinion was confirmed by an observation of Carus.

C. Braun believes "that fibrinous polypi in the form of pedunculated growths, and consisting merely of coagulated blood, rarely occur in the uterus, and that such polypoid bodies are usually the productions of pregnancy, and are occasioned, 1st, by abortion of the ovum during the first months of pregnancy; 2d, by fleshy moles; 3d, retention of an immature placenta for several weeks after the birth of a non-viable foetus; 4th, retention of a portion of matured placenta during several months after the birth of a full-time child; 5th, retention of an abortive ovum after twin pregnancy and birth of a viable foetus; and lastly, 6th, expulsion of a spuri-

ous placenta after the birth of a viable foetus, and spontaneous expulsion of an apparently normal placenta."

Microscopical examination of so-called fibrinous polypi, having enabled C. Braun to recognize them as parts of an ovum or placenta, he is inclined to call them "*placental polypi*."

To C. Braun also belongs the credit of having classified the causes of the formations under consideration. The fleshy mole mentioned as cause No. 2, I cannot consider as such, for, according to Virchow, I understand it to be a hyperplasia of the villi of the chorion, leading to the formation of a tumour unconnected with hæmorrhage. It is a matter of some difficulty, however, to class all these cases under the name of *placental polypi*.

The facts elucidated by the preceding investigations may be resumed as follows.

1. We observe in the uterus polypoid masses, which are the results of conception, consist chiefly of coagula, are frequently attached to the fundus of the uterus by a pedicle, and depend into the dilated uterine or cervical cavities.

2. These formations are incapable of further organization, are never developed into permanent tissue, and consequently have none of the characteristics of organized growths.

3. They are formed either of retained membranes of an abortive ovum; that is, membranes adherent to the uterus form the nucleus of a fibrinous coagulum. This occurs previously to the development of a placenta (during the first and second months of pregnancy).

4. Retained remnants of placenta, or analogous productions form the centre of these growths; or

5. The coagula which occlude the open veins at the seat of the placenta increase inwardly into the dilated uterine cavity.

Although I entirely coincide with the views of C. Braun that the term *fibrinous polypus* is improper, and should cease to be used, still, the proposed name of *placental polypus*

does not seem justified, according to the pathological anatomy of these productions and their origin, as strictly speaking, only those productions mentioned in cause No. 4 deserve this name, laying aside the fact that hitherto by the name "polypus" a proliferation of tissue has always been understood which has no relation with the productions under consideration.

It has not unfrequently been observed that the thrombi projecting from the veins at the seat of the placenta, are capable of increasing by the addition of new coagula, and may project into the uterine cavity as rounded masses, especially during a paralyzed condition of the uterus, in which case the placental veins remain partly open, and the cavity of the uterus is not diminished by proper contractions. These coagula, however, rarely remain adherent to the uterine walls for a long time. At the seat of the placenta they are either loosened and the hæmorrhage is renewed, or endometritis and metritis supervene, causing sloughing of them; or energetic contractions of the uterus expel the coagulum, at the same time diminishing the size of, or closing the open veins at the above-mentioned point.

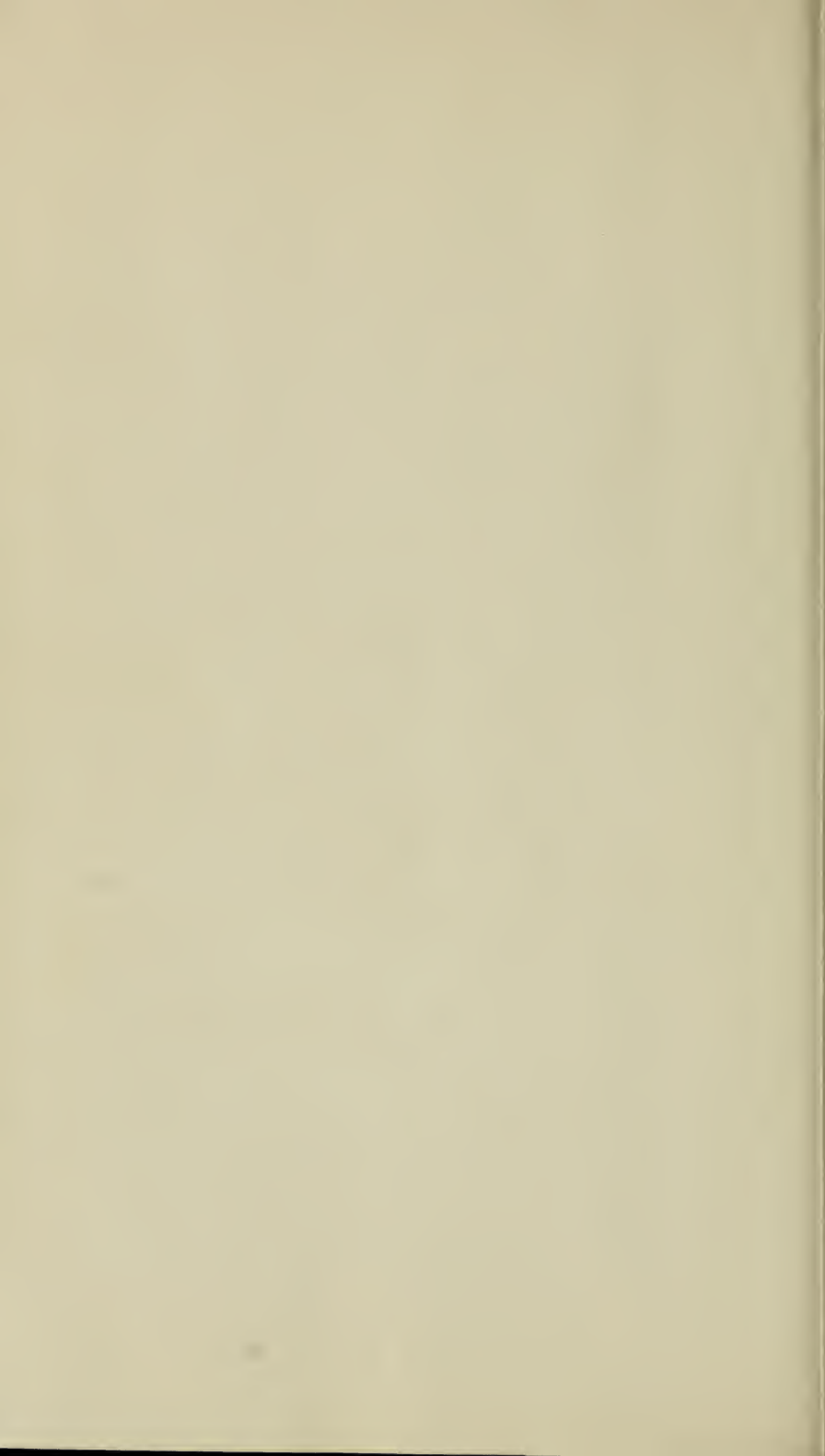
The effects of retained remnants of the placenta will be considered with the pathological anatomy of the latter.

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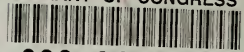








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